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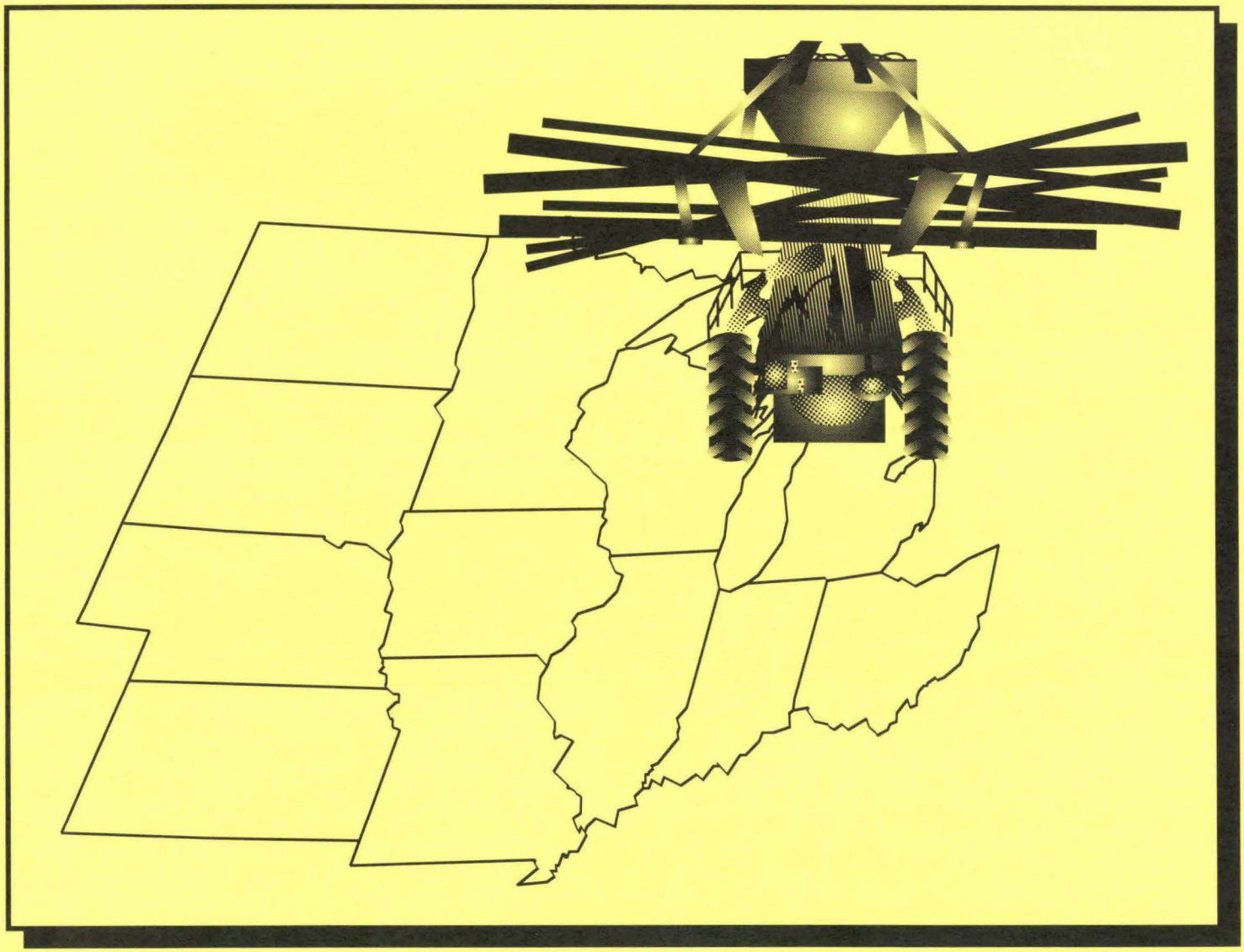
Pulpwood Production in the North-Central Region, 1997

Ronald J. Piva



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Pulpwood Production in the North-Central Region, 1997

Ronald J. Piva

NOTE: This report includes all primary products made from reconstituted wood fiber. In addition to wood pulp, this includes particleboard and engineered lumber products made from chips, shavings, wafers, flakes, strands, and sawdust. This report presents the production by county of the raw fiber material delivered to mills. Thus, these data report only that portion of the timber harvest used as raw material and do not necessarily reflect the volume of growing stock harvested.

Pulpwood constitutes more than half the industrial timber products harvested annually in the Lake States (Michigan, Minnesota, and Wisconsin) and is an important product in the Central States (Illinois, Indiana, Iowa, and Missouri) and the Plains States (Kansas, Nebraska, North Dakota, and South Dakota).

Current detailed information about pulpwood production[1] is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, forest industry development, and scientific studies.

Since 1979, we have included logs, bolts, and wood residue used in manufacturing flakeboard, waferboard, oriented strand board, and medium density fiberboard in this annual report. Engineered lumber was included in this report in 1992. Together, these products are called particleboards, and all mills manufacturing these boards will be called particleboard mills in this paper. Wood used at particleboard mills is identical or nearly identical to wood used at pulp mills; therefore, including this wood in our study provides a more accurate estimate of demand for pulpwood-like material.

Particleboard mills were in their infancy before 1979 and used primarily aspen and wood residue. Therefore, data for these mills do not distort roundwood use trends for other species or preclude comparing 1997 survey results with those of 1978 and previous years.

Pulp and particleboard mills using North Central States timber in 1997 reported their pulpwood receipts[2] by species group and county of origin. This report presents the results of the survey, analyzes the data, compares results with those of 1996 or earlier years, and discusses trends in pulpwood production and use.

The Lake States, Central States, and Plains States are discussed separately because the timber types in each area are different, the flow of wood between the areas is nominal, and more detailed data on pulpwood production and receipts in the Central and Plains States might reveal the operations of individual mills. This is the 39th annual report of the pulpwood harvest in Lake States counties, the 38th annual report of the Central States harvest, and the 5th report of the pulpwood harvest in the Plains States.

Several mills purchase their pulpwood based on weight rather than volume. Conversion factors to convert green tons of pulpwood to standard cord equivalents are shown in the Appendix.

Ronald J. Piva, Forester, received a B.S. degree in forest management from the University of Missouri-Columbia. He joined the Forest Service in 1987, and has been working with the North Central Station's Forest Inventory and Analysis unit since.

[1] *Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut, plus the annual wood residue volume produced by sawmills, veneer mills, etc. used for pulp, particleboard, waferboard, oriented strand board, medium density fiberboard, or engineered lumber.*

[2] *Pulpwood receipts are the volumes of wood received by mills in a specific State or region, regardless of the geographic source.*

LAKE STATES

PRODUCTION

- In 1997, pulpwood production as a whole remained at the 1996 level of 9.5 million cords[3]. Of each cord produced, 92 percent came from roundwood (including chips from roundwood) and 8 percent came from the residue[4] of wood-using plants (fig. 1).

- Hardwoods constituted 78 percent of the total pulpwood production.

- Principal species of roundwood harvested in 1997 were aspen (4.1 million cords), jack pine (695 thousand cords), hard maple (768 thousand cords), soft maple (591 thousand cords), and white birch (506 thousand cords).

- Aspen remained the dominant species of pulpwood roundwood harvested—47 percent of the total.

- Softwood roundwood production decreased by 117 thousand cords, or 6 percent in 1997. Pulpwood production from softwood residue fell 54 thousand cords, a 24-percent decrease from the previous year (fig. 2).

- Whole-tree chip[5] (WTC) production, which makes up 8 percent of the total pulpwood production in the Lake States, increased by 12 percent to 728 thousand cords in 1997. Hardwood WTC production increased by 13 percent and softwood WTC production increased by 5 percent (fig. 3).

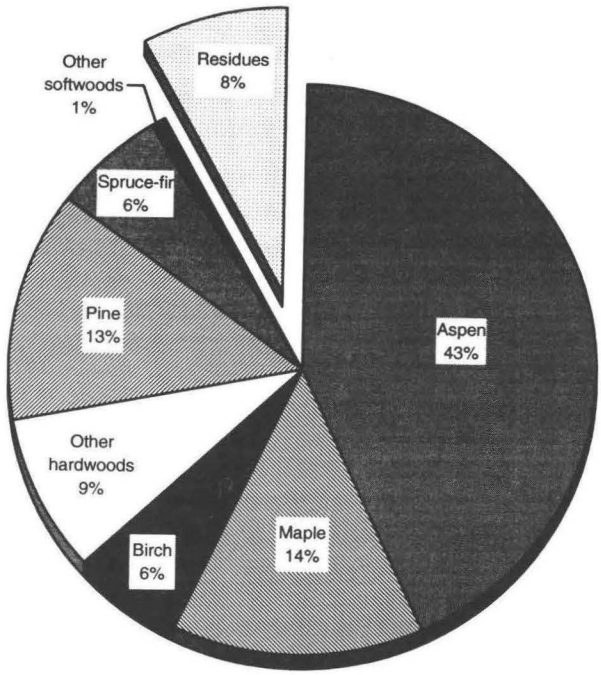

Figure 1.—*Lake States pulpwood production by species group and residues, 1997.*

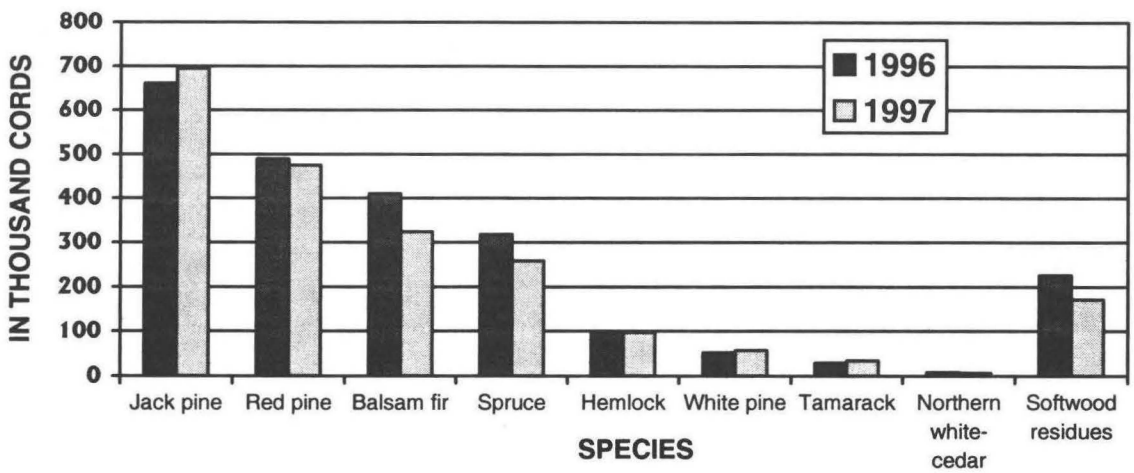

Figure 2.—*Softwood pulpwood production in the Lake States, 1996-1997.*

[3]*All references to cords are in standard cords. A standard cord is 128 cubic feet of wood, bark, and air space.*

[4]*Residue is the byproduct from sawmills, veneer mills, cooperage mills, and other wood-using mills that is used for pulping and particleboard. Residue includes slabs, edgings, veneer cores, sawdust, fines, woodflour, and chips manufactured from slabs, edgings, and veneer cores.*

[5]*Pulpwood produced from chipping entire trees (all portions of the trees above ground, except the stumps).*

Table 1.--Production and imports of pulpwood, Lake States, 1997 [1]

(In standard cords, unpeeled)

Product form, species group, and destination	Production by State [2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S. [3]	Canada		
Roundwood										
N. white-cedar										
Michigan	6,170	--	462	6,632	--	--	--	23	23	6,655
Total	6,170	--	462	6,632	--	--	--	23	23	6,655
Balsam fir										
Canada	5,206	--	--	5,206	--	--	--	--	--	--
Michigan	37,570	--	2,772	40,342	--	--	--	140	140	40,482
Minnesota	1,042	190,063	7,151	198,255	--	--	--	72	72	198,327
Wisconsin	8,072	4,778	67,631	80,481	--	--	--	--	--	80,481
Total	51,889	194,841	77,555	324,285	--	--	--	212	212	319,290
Hemlock										
Michigan	67,734	--	8,771	76,505	--	--	--	183	183	76,688
Wisconsin	2,899	--	17,140	20,039	--	--	--	--	--	20,039
Total	70,633	--	25,911	96,543	--	--	--	183	183	96,727
Jack pine										
Michigan	212,668	--	9,817	222,485	--	--	--	548	548	223,033
Minnesota	--	44,906	2,221	47,127	--	--	--	--	--	47,127
Wisconsin	59,943	40,722	324,873	425,539	24	--	--	1,057	1,081	426,620
Total	272,611	85,628	336,911	695,150	24	--	--	1,606	1,630	696,780
Red pine										
Michigan	95,247	--	6,467	101,714	--	--	--	589	589	102,303
Minnesota	--	27,802	853	28,655	--	--	--	--	--	28,655
Wisconsin	15,812	11,265	317,538	344,615	914	--	--	--	914	345,529
Total	111,059	39,067	324,858	474,984	914	--	--	589	1,502	476,487
White pine										
Michigan	7,177	--	482	7,659	--	--	--	24	24	7,683
Minnesota	--	1,207	--	1,207	--	--	--	--	--	1,207
Wisconsin	1,592	293	46,727	48,612	88	--	--	--	88	48,699
Total	8,769	1,500	47,209	57,478	88	--	--	24	112	57,590
Spruce										
Canada	7,588	--	--	7,588	--	--	--	--	--	--
Michigan	13,965	--	1,157	15,122	--	--	--	51	51	15,173
Minnesota	--	111,681	1,426	113,108	--	--	--	703	703	113,811
Wisconsin	24,755	56,790	41,700	123,246	--	--	--	2,494	2,494	125,740
Total	46,308	168,472	44,284	259,064	--	--	--	3,248	3,248	254,724
Tamarack										
Michigan	3,968	--	309	4,278	--	--	--	15	15	4,293
Minnesota	--	1,880	--	1,880	--	--	--	--	--	1,880
Wisconsin	1,454	19,257	7,803	28,513	--	--	--	--	--	28,513
Total	5,422	21,137	8,112	34,671	--	--	--	15	15	34,687
Total softwood roundwood										
Canada	12,794	--	--	12,794	--	--	--	--	--	--
Michigan	444,498	--	30,238	474,736	--	--	--	1,575	1,575	476,311
Minnesota	1,042	377,539	11,651	390,232	--	--	--	775	775	391,007
Wisconsin	114,528	133,105	823,412	1,071,045	1,025	--	--	3,551	4,576	1,075,621
Total	572,862	510,644	865,301	1,948,807	1,025	--	--	5,901	6,926	1,942,939
Residues										
Softwood										
Canada	4,960	19,137	960	25,057	--	--	--	--	--	--
Michigan	20,498	--	9,619	30,117	--	--	--	541	541	30,659
Minnesota	--	18,656	1,619	20,275	--	--	--	333	333	20,607
Wisconsin	13,176	--	83,507	96,683	88	50,685	39,579	14,781	105,133	201,816
Total	38,634	37,792	95,705	172,132	88	50,685	39,579	15,655	106,007	253,082
Total all softwood material										
Canada	17,754	19,137	960	37,851	--	--	--	--	--	--
Michigan	464,996	--	39,857	504,853	--	--	--	2,116	2,116	506,970
Minnesota	1,042	396,195	13,270	410,507	--	--	--	1,108	1,108	411,614
Wisconsin	127,704	133,105	906,919	1,167,728	1,113	50,685	39,579	18,332	109,709	1,277,437
Total	611,496	548,437	961,006	2,120,939	1,113	50,685	39,579	21,556	112,933	2,196,021

(Table 1 continued on next page)

(Table 1 continued)

Product form, species group, and destination	Production by State [2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S. [3]	Canada		
Roundwood										
Ash										
Michigan	35,601	--	2,049	37,650	--	--	--	28	28	37,678
Minnesota	--	1,026	--	1,026	--	--	--	--	--	1,026
Wisconsin	2,906	2,364	75,447	80,717	84	--	--	--	84	80,801
Total	38,507	3,390	77,496	119,393	84	--	--	28	112	119,505
Aspen										
Michigan	988,370	--	44,960	1,033,330	--	--	--	32,614	32,614	1,065,944
Minnesota	--	2,019,832	22,820	2,042,651	--	2,241	--	75,860	78,101	2,120,752
Wisconsin	52,883	88,384	912,432	1,053,700	--	--	--	6,757	6,757	1,060,456
Total	1,041,253	2,108,216	980,212	4,129,681	--	2,241	--	115,230	117,471	4,247,152
Balsam poplar										
Michigan	40,287	--	5,292	45,579	--	--	--	1,163	1,163	46,743
Minnesota	--	111,004	111	111,115	--	45	--	17,186	17,231	128,346
Wisconsin	12	1,141	1,064	2,217	--	--	--	--	--	2,217
Total	40,300	112,145	6,468	158,912	--	45	--	18,349	18,394	177,306
Basswood										
Michigan	64,585	--	5,144	69,728	--	--	--	245	245	69,973
Minnesota	--	1,984	--	1,984	--	--	--	--	--	1,984
Wisconsin	1,257	380	50,551	52,188	42	--	--	--	42	52,230
Total	65,842	2,364	55,694	123,900	42	--	--	245	287	124,187
Beech										
Michigan	44,869	--	4,759	49,628	--	--	--	70	70	49,698
Wisconsin	8	--	1,048	1,056	--	--	--	--	--	1,056
Total	44,877	--	5,807	50,684	--	--	--	70	70	50,754
White birch										
Michigan	138,763	--	30,781	169,544	--	--	--	852	852	170,396
Minnesota	--	79,725	3,459	83,184	--	--	--	4	4	83,189
Wisconsin	6,805	43,025	203,202	253,032	137	--	--	3,488	3,624	256,657
Total	145,568	122,750	237,442	505,760	137	--	--	4,344	4,481	510,241
Yellow birch										
Michigan	33,917	--	3,163	37,081	--	--	--	54	54	37,135
Wisconsin	461	--	16,175	16,636	--	--	--	--	--	16,636
Total	34,378	--	19,338	53,716	--	--	--	54	54	53,771
Cottonwood										
Wisconsin	13	1	1,465	1,479	--	--	--	--	--	1,479
Total	13	1	1,465	1,479	--	--	--	--	--	1,479
Elm										
Wisconsin	420	37	35,163	35,621	6	--	--	--	6	35,627
Total	420	37	35,163	35,621	6	--	--	--	6	35,627
Hickory										
Wisconsin	81	34	1,080	1,195	6	--	--	--	6	1,201
Total	81	34	1,080	1,195	6	--	--	--	6	1,201
Hard maple										
Michigan	523,487	--	51,765	575,252	--	--	--	1,345	1,345	576,597
Minnesota	--	3,253	998	4,251	--	--	--	--	--	4,251
Wisconsin	6,753	4,901	177,174	188,829	129	--	--	--	129	188,957
Total	530,240	8,154	229,937	768,332	129	--	--	1,345	1,473	769,805
Soft maple										
Michigan	405,386	--	28,853	434,239	--	--	--	525	525	434,764
Minnesota	--	4,260	1,126	5,386	--	--	--	--	--	5,386
Wisconsin	4,433	2,373	144,913	151,720	66	--	--	--	66	151,786
Total	409,819	6,634	174,892	591,345	66	--	--	525	591	591,936
Red oak										
Michigan	72,787	--	946	73,732	--	--	--	13	13	73,746
Wisconsin	2,706	899	87,274	90,879	140	--	--	--	140	91,019
Total	75,493	899	88,219	164,611	140	--	--	13	153	164,764
White oak										
Michigan	71,288	--	--	71,288	--	--	--	--	--	71,288
Wisconsin	640	65	25,667	26,371	6	--	--	--	6	26,377
Total	71,928	65	25,667	97,660	6	--	--	--	6	97,666
Other hardwoods										
Michigan	26,970	--	3,058	30,028	--	--	--	52	52	30,080
Wisconsin	240	89	3,689	4,019	15	--	--	--	15	4,034
Total	27,210	89	6,747	34,046	15	--	--	52	68	34,114

(Table 1 continued on next page)

(Table 1 continued)

Product form, species group, and destination	Production by State [2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S. [3]	Canada		
Total hardwood roundwood										
Michigan	2,446,311	--	180,770	2,627,080	--	--	--	36,962	36,962	2,664,042
Minnesota	--	2,221,084	28,514	2,249,598	--	2,286	--	93,050	95,336	2,344,933
Wisconsin	79,619	143,694	1,736,345	1,959,658	631	--	--	10,244	10,876	1,970,534
Total	2,525,930	2,364,778	1,945,628	6,836,336	631	2,286	--	140,256	143,173	6,979,509
Residues										
Hardwood										
Canada	--	19,427	--	19,427	--	--	--	--	--	--
Michigan	192,693	--	13,319	206,012	15,529	--	--	1,987	17,516	223,528
Minnesota	--	36,380	3,089	39,469	--	--	--	7,813	7,813	47,282
Other [4]	--	--	1,492	1,492	--	--	--	--	--	--
Wisconsin	15,890	10,576	269,565	296,031	2,661	--	--	--	2,661	298,692
Total	208,583	66,383	287,464	562,431	18,190	--	--	9,800	27,990	569,501
Total all hardwood material										
Canada	--	19,427	--	19,427	--	--	--	--	--	--
Michigan	2,639,004	--	194,088	2,833,092	15,529	--	--	38,949	54,478	2,887,570
Minnesota	--	2,257,464	31,603	2,289,067	--	2,286	--	100,862	103,149	2,392,215
Other [4]	--	--	1,492	1,492	--	--	--	--	--	--
Wisconsin	95,509	154,270	2,005,910	2,255,689	3,292	--	--	10,244	13,536	2,269,225
Total	2,734,513	2,431,161	2,233,093	7,398,767	18,821	2,286	--	150,056	171,163	7,549,010
Total all roundwood										
Canada	12,794	--	--	12,794	--	--	--	--	--	--
Michigan	2,890,809	--	211,008	3,101,816	--	--	--	38,537	38,537	3,140,353
Minnesota	1,042	2,598,623	40,165	2,639,830	--	2,286	--	93,825	96,111	2,735,940
Wisconsin	194,147	276,799	2,559,757	3,030,703	1,656	--	--	13,795	15,452	3,046,155
Total	3,098,792	2,875,422	2,810,929	8,785,143	1,656	2,286	--	146,157	150,099	8,922,448
Total all residues										
Canada	4,960	38,564	960	44,484	--	--	--	--	--	--
Michigan	213,191	--	22,938	236,129	15,529	--	--	2,529	18,058	254,187
Minnesota	--	55,036	4,708	59,744	--	--	--	8,146	8,146	67,889
Other [4]	--	--	1,492	1,492	--	--	--	--	--	--
Wisconsin	29,066	10,576	353,072	392,714	2,749	50,685	39,579	14,781	107,794	500,508
Total	247,217	104,176	383,170	734,563	18,278	50,685	39,579	25,456	133,997	822,584
Total all wood material										
Canada	17,754	38,564	960	57,278	--	--	--	--	--	--
Michigan	3,104,000	--	233,946	3,337,945	15,529	--	--	41,065	56,594	3,394,539
Minnesota	1,042	2,653,659	44,873	2,699,574	--	2,286	--	101,970	104,256	2,803,830
Other [4]	--	--	1,492	1,492	--	--	--	--	--	--
Wisconsin	223,214	287,375	2,912,828	3,423,417	4,405	50,685	39,579	28,577	123,246	3,546,663
Total	3,346,009	2,979,598	3,194,099	9,519,706	19,934	52,971	39,579	171,612	284,096	9,745,032

[1] Table may not add due to rounding.

[2] Vertical columns of figures under the box heading "Production by State" present the amount of roundwood cut or residue generated in each State.

[3] Mostly Western States.

[4] Pulpwood shipped to mills outside of region.

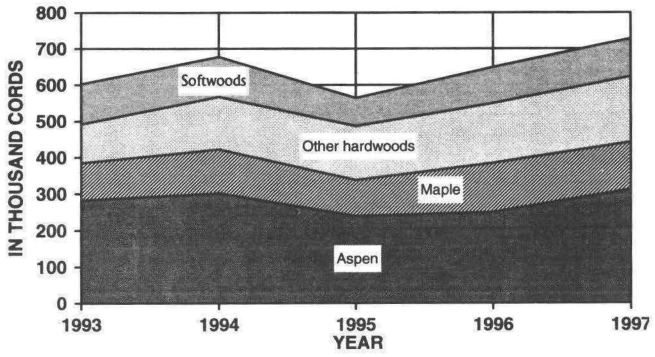

Figure 3.—*Whole-tree chip production in the Lake States, 1993-1997.*

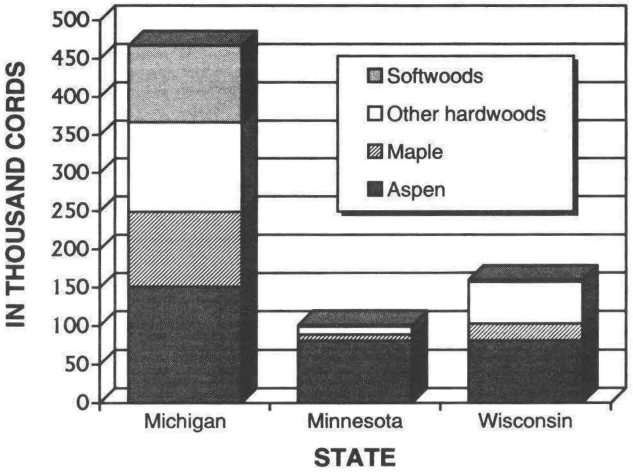

Figure 4.—*Whole-tree chip production by State in the Lake States, 1997.*

- Michigan was the major producer of WTC in the Lake States in 1997 with 467 thousand cords (64 percent of the WTC production) (fig. 4).

- Aspen was the predominant species used in WTC in 1997 with 312 thousand cords or 43 percent of the total WTC production.

- Jack pine was the predominant softwood species used in WTC in 1997, making up 92 percent of the softwood WTC production and 13 percent of the total WTC production.

Michigan

- Michigan pulpwood production rose to 3.3 million cords in 1997, an 8-percent increase over 1996 (fig. 5).

- In 1997, hardwoods accounted for 82 percent of Michigan's pulpwood production.

- Roundwood production for pulpwood in 1997 increased by 9 percent to 3.1 million cords (fig. 6).

- The Western Upper Peninsula was the top producing region in the State in 1997 with 38 percent of the roundwood harvested.

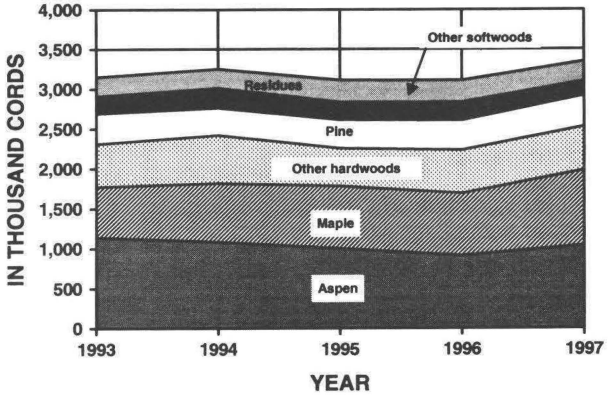

Figure 5.—*Michigan pulpwood production by species group and residues, 1993-1997.*

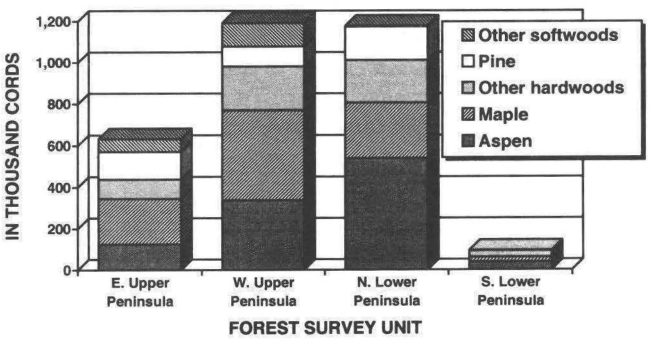

Figure 6.—*Michigan roundwood pulpwood production by Forest Survey Unit and species groups, 1997.*

- Marquette County in the Western Upper Peninsula was the top producer of roundwood in the State with 291 thousand cords.

- Roundwood pulpwood production in 1997 increased by 43 percent in the Southern Lower Peninsula, increased by 37 percent in the Northern Lower Peninsula, decreased by 12 percent in the Western Upper Peninsula, and decreased by 8 percent in the Eastern Upper Peninsula.

- The production of pulpwood from residues decreased by 11 percent in 1997, falling from 810 thousand cords in 1996 to 735 thousand cords in 1997.

Minnesota

- Pulpwood production decreased by 3 percent to 3.0 million cords in 1997 (fig. 7).

- Hardwoods accounted for 82 percent of the total pulpwood produced in 1997.

- Ninety-seven percent of the pulpwood produced came from roundwood.

- The Northern Pine and the Aspen-Birch Units were the top pulpwood-producing roundwood areas in the State in 1997 with 1.5 million cords and 1.0 million cords, respectively (fig. 8).

- St. Louis County, in the Aspen-Birch Unit, remained the top roundwood-producing county with 520 thousand cords, followed by Itasca County with 393 thousand cords.

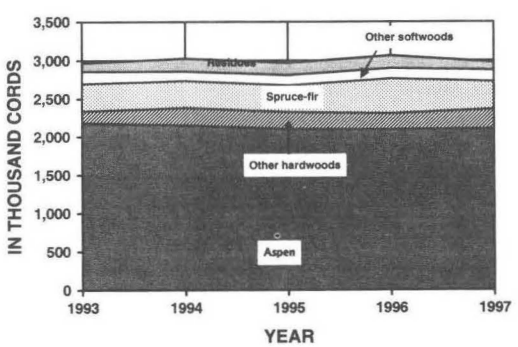

Figure 7.—*Minnesota pulpwood production by species group and residues, 1993-1997.*

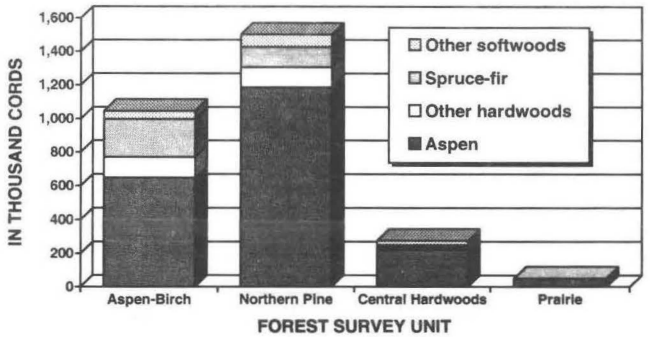

Figure 8.—*Minnesota roundwood pulpwood production by Forest Survey Unit and species group, 1997.*

- After falling for three straight years, aspen pulpwood production rose by 10 thousand cords in 1997. Aspen accounted for 73 percent of the roundwood harvested.

- Pulpwood production from hardwood residues decreased by 37 percent and softwood residue use decreased by 40 percent.

Wisconsin

- Pulpwood production in Wisconsin decreased by 3 percent in 1997 to 3.2 million cords (fig. 9).

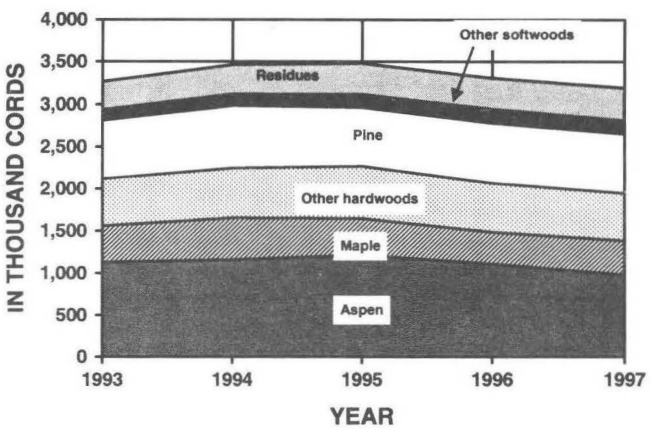

Figure 9.—*Wisconsin pulpwood production by species group and residues, 1993-1997.*

- Hardwoods accounted for 70 percent of the total pulpwood production in 1997.

- Roundwood harvested for pulpwood accounted for 88 percent of the pulpwood produced in 1997.

- The Northwest remained the top producer of roundwood for pulping in the State in 1997 with 1.1 million cords (fig. 10).

- Douglas County in the Northwest Unit remained the top pulpwood-producing county in the State with 185 thousand cords.

- Aspen harvests decreased by 12 percent to 980 thousand cords in 1997.

- The use of softwood residues for pulpwood increased by 28 percent while the use of hardwood residues decreased by just over a half percent.

Harvesting Intensity

- In this report, we show the distribution of the harvest in two ways: first, the amount of pulpwood cut relative to the growing-stock volume in each of five major pulpwood species (fig. 11); and, second, the amount of pulpwood relative to commercial timberland area (fig. 12).

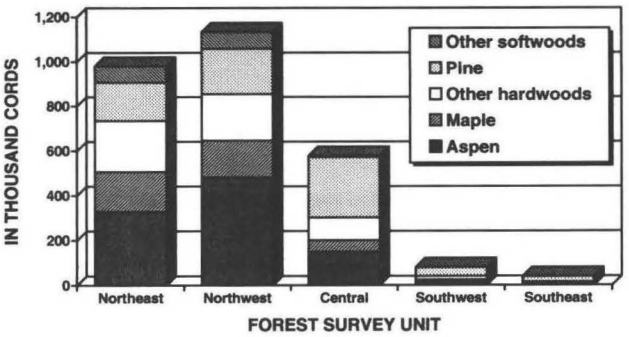

Figure 10.—*Wisconsin roundwood pulpwood production by Forest Survey Unit and species group, 1997.*

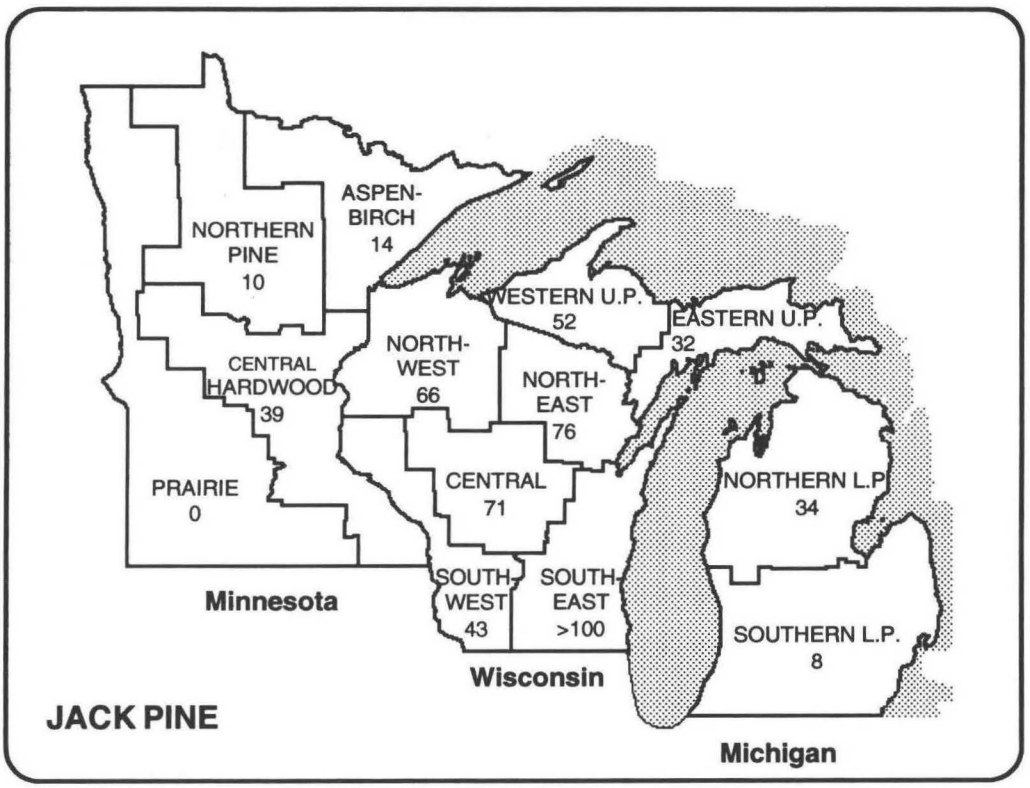

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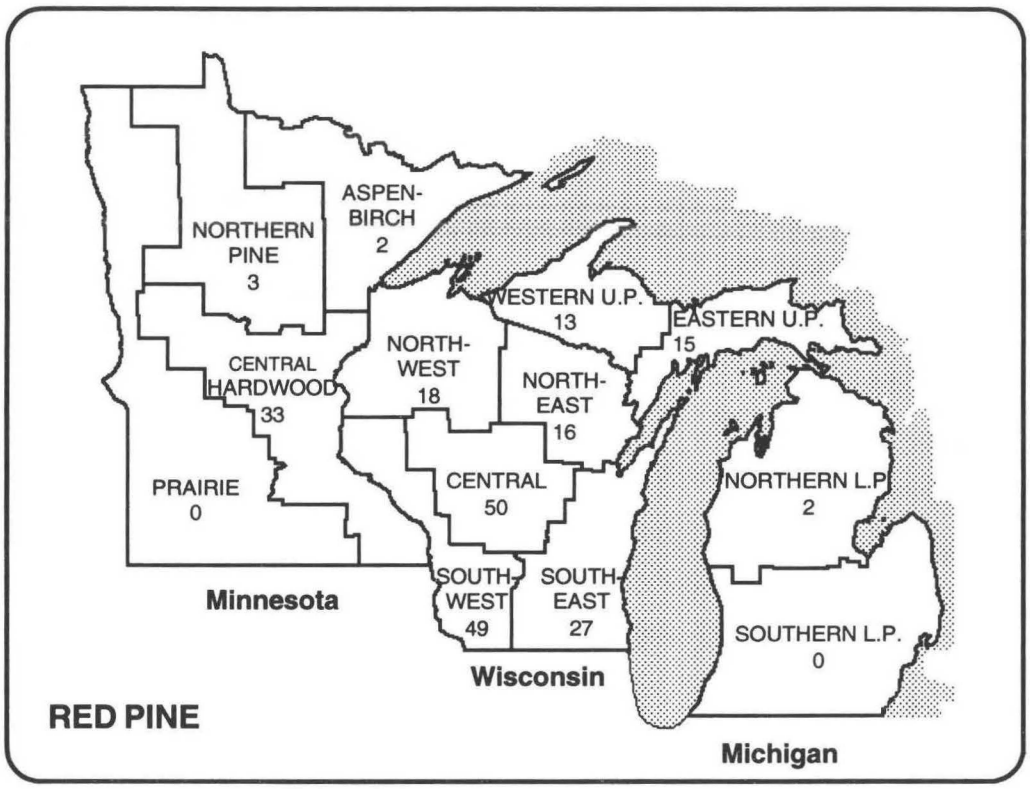
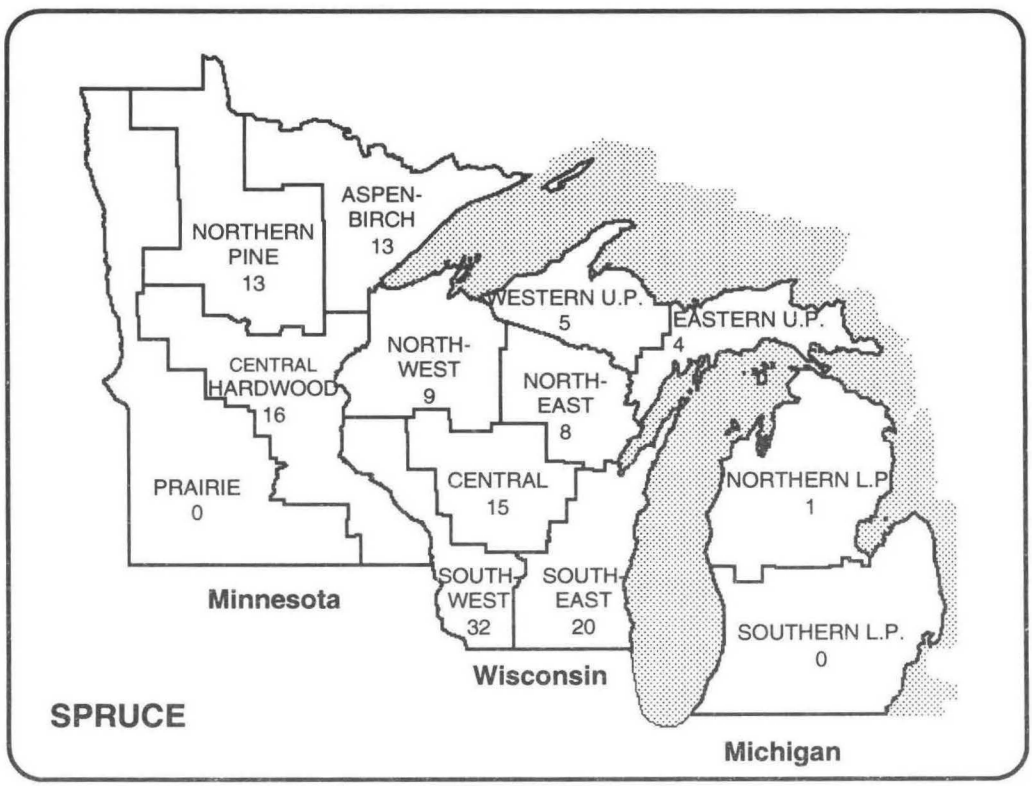
Figure 11.—*Cords of roundwood pulpwood (including chips from roundwood) harvested per 1,000 cords of growing-stock volume for each of five principal pulpwood species by Forest Survey Unit, 1997. Growing-stock volume was determined during the last forest inventory for each State.*

(Figure 11 continued)





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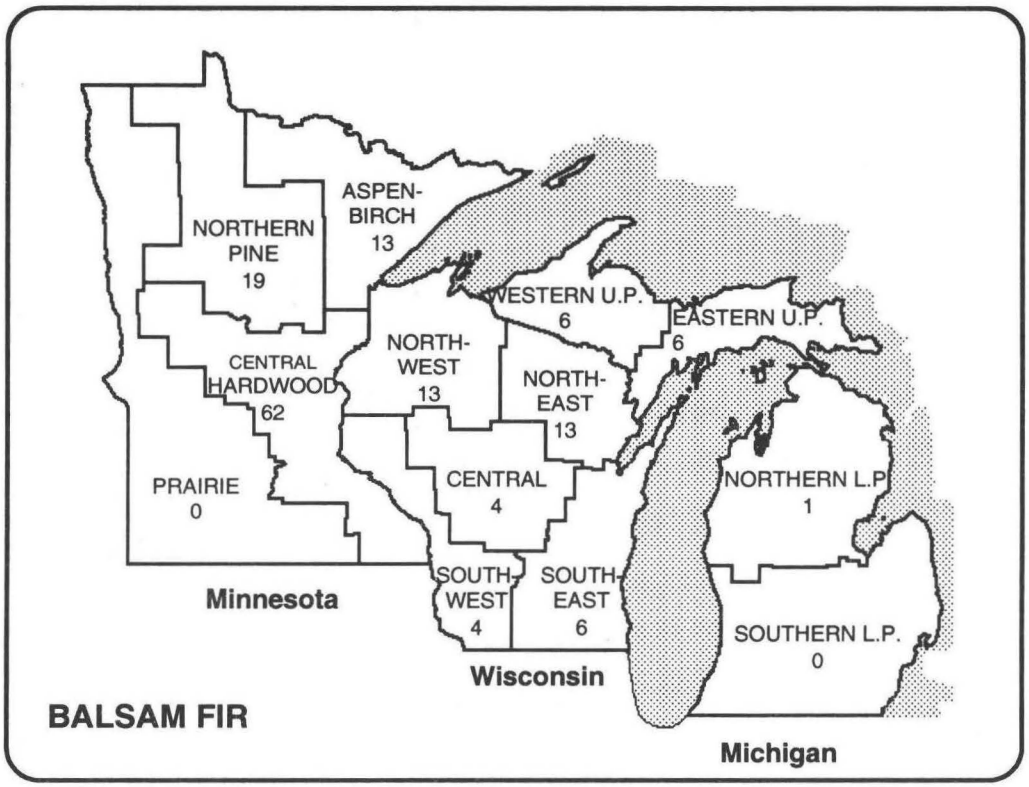

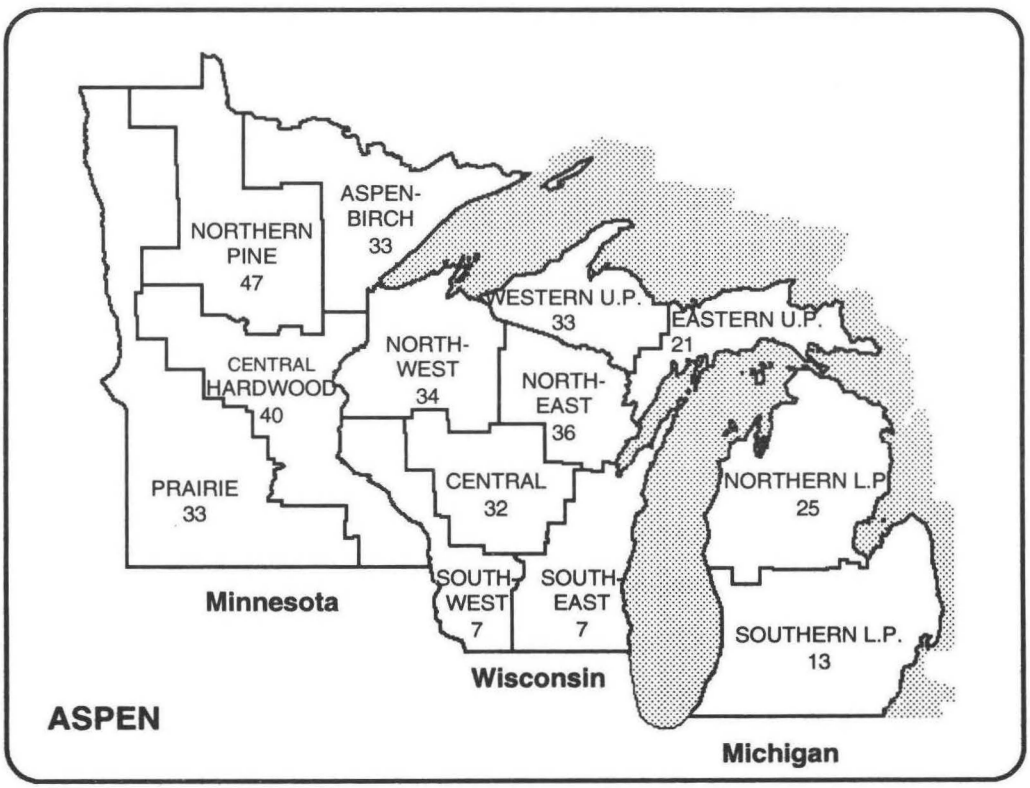

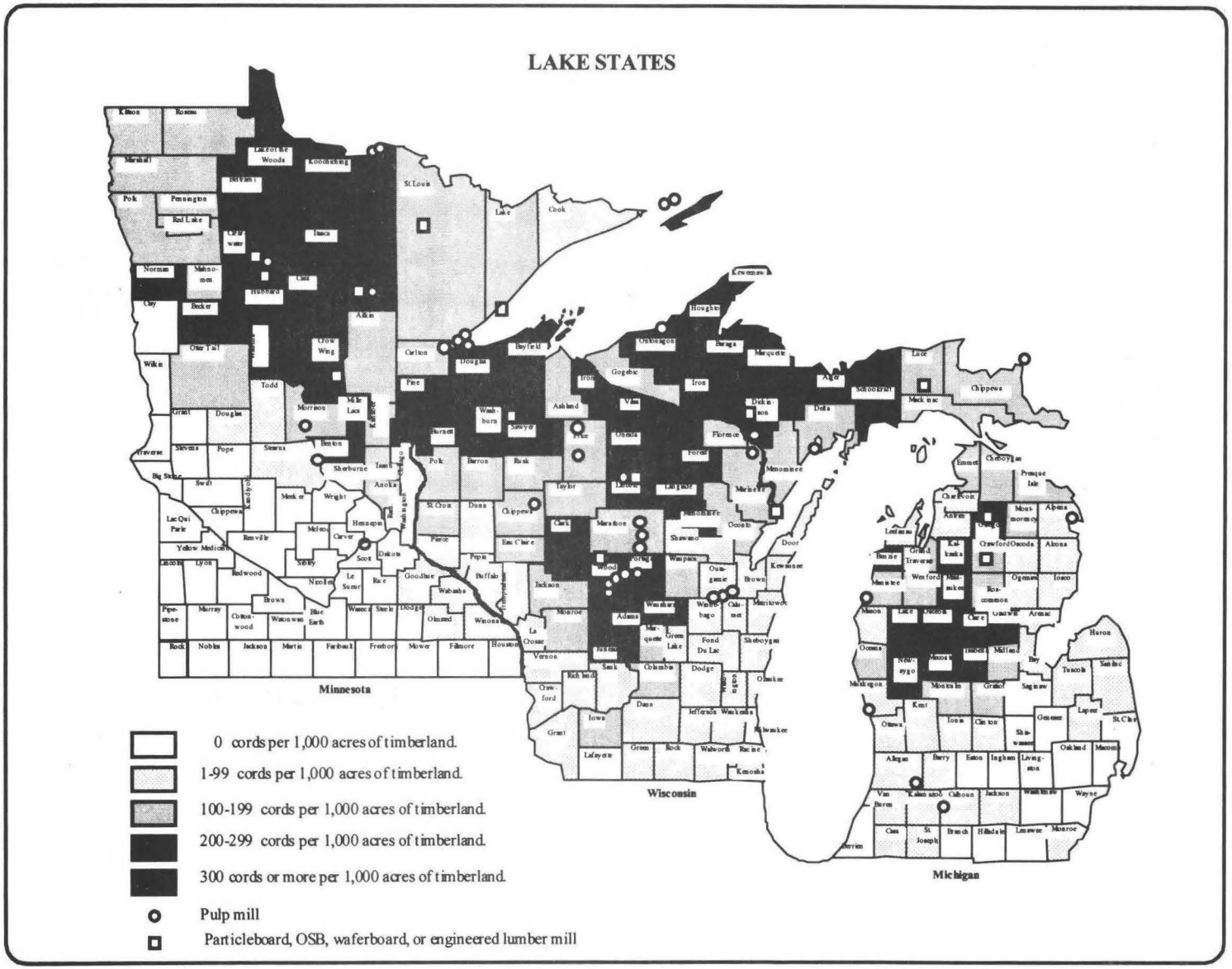
LAKE STATES
Minnesota
Wisconsin
Michigan
0 cords per 1,000 acres of timberland.
1-99 cords per 1,000 acres of timberland.
100-199 cords per 1,000 acres of timberland.
200-299 cords per 1,000 acres of timberland.
300 cords or more per 1,000 acres of timberland.
Pulp mill
Particleboard, OSB, waferboard, or engineered lumber mill

Figure 12.—*Cords of pulpwood cut per 1,000 acres of timberland in principal pulpwood-producing counties, 1997. Acres of timberland (stocking of trees greater than 16.7 percent) were determined during the last inventory in each State. Locations of active pulp and particleboard mills are shown.*

Pulpwood harvesting was most intensive in the following areas by species: (100,000 cords or more)

Species	State	Survey Unit
Jack pine	Michigan	N. Lower Peninsula
	Wisconsin	Northwest, Central
Red pine	Wisconsin	Central
Spruce	Minnesota	Aspen-Birch
Balsam fir	Minnesota	Aspen-Birch
Aspen	Michigan	N. Lower Peninsula, W. Upper Peninsula, E. Upper Peninsula
	Minnesota	Northern Pine, Aspen-Birch, Central Hardwood
	Wisconsin	Northwest, Northeast, Central
White birch	Wisconsin	Northwest
Hard maple	Michigan	W. Upper Peninsula, E. Upper Peninsula, N. Lower Peninsula
	Wisconsin	Northeast
Soft maple	Michigan	W. Upper Peninsula, N. Lower Peninsula

RECEIPTS

- In 1997, 35 woodpulp and 14 particleboard mills in the Lake States acquired 9.7 million cords of pulpwood, less than 10 thousand cords lower than 1996 total receipts (fig. 13).
- In 1997, Wisconsin supplied wood to 33 mills, Michigan supplied 31 mills, and Minnesota supplied 27 mills.
- Total imports of roundwood decreased by 30 percent, with Canada supplying 98 percent of the total import volume.
- Hardwood residue imported into the Lake States increased by 91 percent in 1997 to 28 thousand cords. Softwood residue imported into the region remained at 106 thousand cords. The Plains and Western States supplied 68 percent of the total residues imported into the Lake States in 1997. The remainder of the residues came from Canada (19 percent) and the Central States (13 percent).
- Total imports of all wood material decreased to 284 thousand cords, a 15-percent decrease from 1996. Canada contributed 60 percent of the total import receipts.

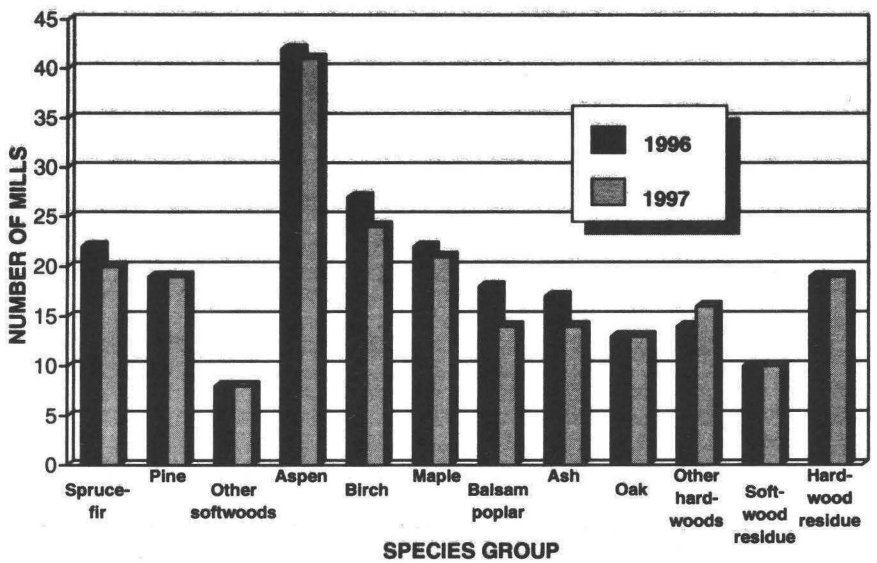

Figure 13.—*Numbers of industrial plants in the Lake States using a particular species or residue for pulping and particleboard, 1996-1997.*

Michigan

- Twelve Michigan mills consumed 3.4 million cords, up 9 percent from the previous year. Nine percent of the total consumption was imported from out of State, with Wisconsin supplying 81 percent of the imports.

Minnesota

- The 16 mills in Minnesota reported consuming an estimated 2.8 million cords in 1997, a decrease of 3 percent from 1996. Five percent of Minnesota's consumption for pulpwood came from out of State sources. Canada furnished 68 percent of the imported wood material.

Wisconsin

- The 21 mills in Wisconsin consumed 3.5 million cords in 1997, a decrease of 6 percent from 1996. Eighteen percent of the total receipts were imported from out of State. Imports from Minnesota and Michigan accounted for 45 percent and 35 percent of the total imports, respectively.

INDUSTRY TRENDS AND ANALYSIS

Pulp Mills

In this section pulp mills include wood fiber products such as paper, paperboard, hardboard, insulation board, and medium-density fiberboard. All of these products are manufactured from wood that has been reduced to individual fibers, small fiber bundles, or fiber parts that are subsequently formed into a mat.

- Of the 9.5 million cords of pulpwood produced in 1997, 7.0 million cords (74 percent) were used for woodpulp products. Of each cord used to produce pulp, 91 percent was roundwood and 9 percent was residues.

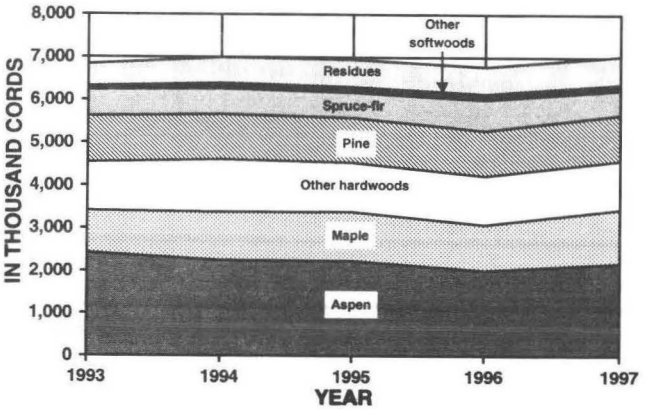

Figure 14.—*Pulpwood production in the Lake States for pulp by species group and residues, 1993-1997.*

- Principal species harvested for pulp were aspen (2,183 thousand cords), hard maple (748 thousand cords), jack pine (561 thousand cords), soft maple (512 thousand cords), and red pine (457 thousand cords) (fig. 14).

- In 1997, hardwoods were still the mainstays of the pulp mills in the region with hardwood roundwood contributing 65 percent of total production and hardwood residues supplying another 7 percent.

- The use of softwood roundwood by the pulp mills in the Lake States decreased by 6 percent in 1997. Softwood residue use, on the other hand, increased by 17 percent from the previous year.

- Average daily woodpulp production was 15.1 thousand tons in 1997—up from 14.3 thousand tons in 1996 (table 3).

- Lake States pulpwood production for pulp mills in 1993-1997 was:

Product form and species group	Production				
	1993	1994	1995	1996	1997
	(Thousand cords)				
Roundwood					
Softwoods	1,780	1,790	1,776	1,920	1,788
Aspen	2,427	2,253	2,241	2,018	2,183
Other hardwoods	2,113	2,351	2,291	2,209	2,401
Residue	514	594	642	630	649
Total	6,834	6,989	6,949	6,778	7,021

Michigan

- Pulpwood production for woodpulp was 2.5 million cords in 1997, a 14-percent increase over 1996.

- Aspen was the major pulpwood species harvested in the State with 545 thousand cords, a 32-percent increase from 1996. Other major species were jack pine with 149 thousand cords and white birch with 121 thousand cords.

- Michigan mills imported 206 thousand cords of pulpwood for processing (186 thousand cords from Wisconsin and 20 thousand cords from Indiana and Canada combined). Michigan exported 227 thousand cords to Minnesota, Wisconsin, and Canada. Ninety percent of the wood imported was in the form of roundwood, and 80 percent of the exports were roundwood.

- Michigan mills used 2,150 thousand cords of hardwood material in 1997, an increase of 23 percent from 1996. The use of softwood material in 1997 decreased by 4 percent to 363 thousand cords.

Minnesota

- Pulpwood production for woodpulp totaled 1.7 million cords in 1997, a decline of 3 percent from 1996.

- Aspen was the predominant species harvested in the State with 988 thousand cords, 6 percent more than the previous year. Other major species were balsam fir with 195 thousand cords and spruce with 168 thousand cords.

- Mills in Minnesota imported 123 thousand cords for pulp products (77 thousand cords from Canada, 45 thousand cords from Wisconsin, and 1 thousand cords from Michigan). Minnesota exported 200 thousand cords to Wisconsin and 39 thousand cords to Canada. Roundwood made up 90 percent of the imports and 79 percent of the exports.

- In 1997, Minnesota mills had a 1-percent decrease in the use of hardwood material, from 1,223 thousand cords in 1996 to 1,209 thousand cords in 1997. The use of softwood material decreased by 10 percent to 403 thousand cords in 1997.

Wisconsin

- Pulpwood production for woodpulp products remained at 2.8 million cords in 1997.

- Aspen was the main species harvested with 650 thousand cords, a 3-percent decrease from the previous year. Other major species were jack pine (334 thousand cords), red pine (323 thousand cords), white birch (235 thousand cords), hard maple (229 thousand cords), and soft maple (164 thousand cords).

- Wisconsin mills imported 525 thousand cords of pulpwood: 213 thousand cords from Michigan, 199 thousand cords from Minnesota, 95 thousand cords from other States, and 18 thousand cords from Canada. Wisconsin exported 186 thousand cords to Michigan, 45 thousand cords to Minnesota, and 1 thousand cords to other States. Roundwood accounted for 87 percent of the wood material exported and 74 percent of the wood material imported.

- The use of hardwood material in Wisconsin pulp mills decreased by 3 percent and the use of softwood material decreased by 4 percent.

Particleboard Mills

Particleboard is a generic term for a panel manufactured from lignocellulosic material—commonly wood—essentially in the form of particles (as distinct from fibers). These materials are bonded together with synthetic resin or other suitable binder under heat and pressure by a process wherein the interparticle bonds are created wholly by the added binder and to which other materials may have been added during manufacture to improve certain properties. The many types of particleboard differ greatly in regard to size and geometry of the particle, the amount of resin (adhesive) used, and the density to which the panel is pressed. The major types of particles used for particleboard are shavings, flakes, wafers, chips, sawdust, strands, slivers, and wood wool (excelsior). Most particleboard in the U.S. is made from residues (shavings, sawdust, or

chips), but some types require that roundwood (saw logs or pulpwood) be used. Waferboard is an example of a product requiring that the particles be cut from solid wood. A new product called engineered lumber was added to this generic term in 1992.

- The Lake States produced 2.5 million cords of pulpwood in 1997 for particleboard products, down 8 percent from 1996. For every cord of pulpwood used in particleboard manufacture, 97 percent came from roundwood and 3 percent was residues from wood-using plants (sawmills, veneer mills, etc.).

- Principal species harvested for particleboard products were aspen (1,946 thousand cords), jack pine (134 thousand cords), white birch (93 thousand cords), balsam poplar (81 thousand cords), and soft maple (79 thousand cords) (fig. 15).

- Total softwood roundwood received at Lake States particleboard mills increased from 146 thousand cords in 1996 to 161 thousand cords in 1997, an increase of 11 percent. Softwood residue use decreased by 80 percent, from 95 thousand cords in 1996 to 19 thousand cords in 1997.

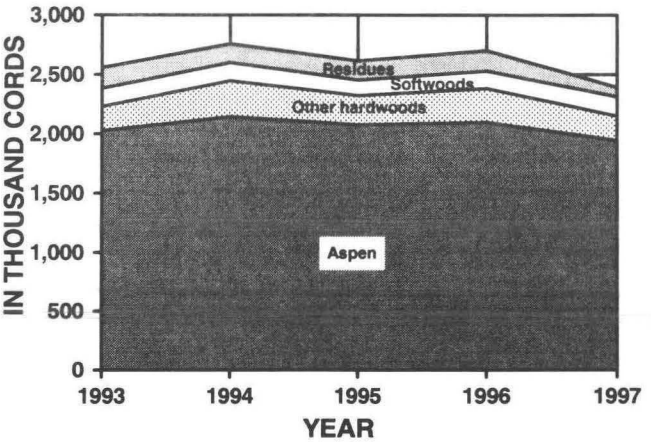

Figure 15.—*Pulpwood production for particleboard in the Lake States, 1993-1997.*

- In 1997, Lake States particleboard plants received 2,320 thousand cords of hardwood roundwood, a decrease of 6 percent from the 1996 total of 2,468 thousand cords. Hardwood residue use decreased by 20 percent—from 84 thousand cords in 1996 to 67 thousand cords in 1997.

- Lake States pulpwood production for particleboard mills in 1993-1997 was:

Product form and species	Production				
	1993	1994	1995	1996	1997
	(Thousand cords)				
Roundwood					
Softwoods	152	149	128	146	161
Aspen	2,028	2,146	2,079	2,102	1,946
Other hardwoods	204	303	245	281	306
Residue	175	161	163	179	86
Total	2,559	2,759	2,616	2,708	2,499

- National housing starts in 1997 remained at 1.5 million units. Even with stable or lower mortgage rates and a continuation of good economic reports, the increased costs of building materials contributed to the leveling off of housing starts.

Michigan

- Pulpwood harvested for particleboard products totaled 802 thousand cords in 1997, of which 143 thousand cords were softwoods and 659 thousand cords were hardwoods. Residues used for particleboard products added another 11 thousand cords.

- The particleboard mills in Michigan imported 48 thousand cords from Wisconsin and 36 thousand cords from Canada. Raw materials exported for particleboard production amounted to 15 thousand cords.

Minnesota

- Minnesota accounted for half of the wood material produced in the Lake States for particleboard plants. Timber logged for particleboard products totaled 1.3 million cords; aspen was the predominant species cut (1.2 million cords). Only 6 thousand cords of residues were produced in 1997.

- The particleboard mills in Minnesota imported 25 thousand cords from Canada and 2 thousand cords from the Plains States. In 1997, raw materials exported from the State for particleboard manufacturing totaled 89 thousand cords.

Wisconsin

- In 1997, Wisconsin produced 365 thousand cords of roundwood for particleboard manufacturing, of which 9 thousand cords were softwood and 356 thousand cords were hardwood. Wisconsin's wood processing mills provided an additional 69 thousand cords of plant byproducts to the particleboard industry.

- The mills in Wisconsin imported 109 thousand cords of wood for particleboard manufacturing: 88 thousand cords from Minnesota, 10 thousand cords from Michigan, and 11 thousand cords from Canada. Wisconsin exported 49 thousand cords to Michigan, Minnesota, and Canadian particleboard mills in 1997.

New Mills, Expansions, and Closures

Major pulp mill expansion, new construction, and closures are as follows:

- Aspen Bay Pulp and Fibre is building the first bleached chemi-thermomechanical pulp mill in the U.S. in Menominee, MI. The 215,000 tpy mill should be finished in 2000.

- Badger Paper Mills, Inc., Peshtigo, WI, closed its pulp mill in June of 1996.

- G-P Flakeboard Limited completed construction of a medium density fiberboard (MDF) operation in Sault Ste. Marie, Ontario, Canada. The plant began operation in May of 1996.

- Potlatch Corp., Cloquet, MN, is rebuilding the bleached kraft pulp mill which will double its capacity by 2000.

CENTRAL STATES

PRODUCTION

- Pulpwood production in the Central States (Illinois, Indiana, Iowa, and Missouri) increased by 5 percent—from 393 thousand cords in 1996 to 412 thousand cords in 1997 (fig. 16). Illinois production fell 32 percent, Indiana rose 17 percent, Iowa rose 54 percent, and Missouri rose 5 percent above the 1996 production levels.

- Pulpwood production from roundwood decreased by 2 percent in 1997. A 68-percent decrease of exports to Northeastern States mills from the Central States accounted for the majority of this decrease.

- Roundwood made up 40 percent of the total wood material used for pulpwood production in the Central States in 1997.

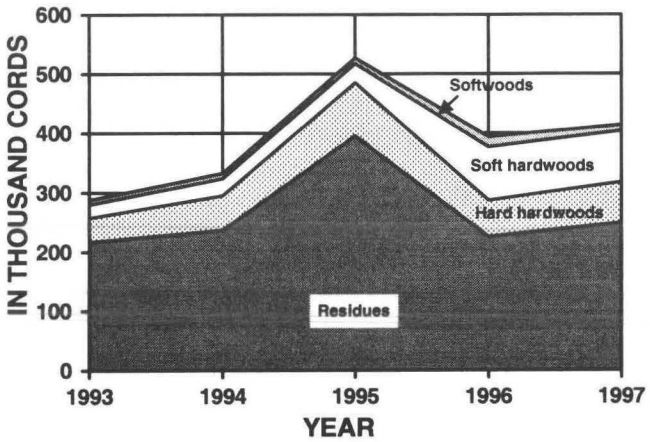

Figure 16.—*Pulpwood production in the Central States, 1993-1997.*

- Pulpwood production from soft hardwood[7] roundwood fell slightly from 90 thousand cords in 1996 to 86 thousand cords in 1997. Hard hardwood[8] production offset the loss in soft hardwood production by increasing from 61 thousand cords in 1996 to 67 thousand cords in 1997.

- Residue use for the production of pulpwood increased by 10 percent in 1997. The addition of another Iowa mill to this report accounts for the majority of this increase. Residue production for Iowa doubled from 1996 to 1997 with the addition of this mill.

- Hardwood residue from primary wood-using mills made up 92 percent or 230 thousand cords of the 249 thousand cords of total residue produced.

- Exports of roundwood and residues from the Central States in 1997 increased by 6 percent to 279 thousand cords. Central States pulpwood was shipped to Arkansas, Kentucky, Louisiana, Michigan, Ohio, Oklahoma, and Wisconsin mills.

- Loggers harvested pulpwood in 17 counties of Illinois, 17 counties in Indiana, 12 counties in Iowa, and 17 counties in Missouri (fig. 17).

- Whole-tree chips made up 35 percent of the pulpwood produced from roundwood for the Central States in 1997. The 56 thousand cords of whole-tree chips were a 13-percent increase from the 1996 volume.

Illinois

- Illinois produced 70 thousand cords of pulpwood in 1997, down 26 percent from 1996. Illinois contributed 17 percent of the total production in the Central States in 1997 (fig. 18).

- Illinois does not have any primary woodpulp or particleboard mills; consequently, all pulpwood harvested is shipped to plants outside the State.

Indiana

- Pulpwood production in Indiana accounted for 42 percent of the total pulpwood produced in the Central States region in 1997, or 175 thousand cords, a 17-percent increase from 1996.

- Roundwood production decreased by 13 percent in 1997, while residue production increased by 38 percent.

Iowa

- Iowa's total pulpwood production in 1997 was 35 thousand cords, an increase of 54 percent. The State contributed 9 percent of the region's total.

- Softwood residues accounted for 43 percent of Iowa's pulpwood production in 1997 and hardwood residues accounted for another 28 percent.

Missouri

- Missouri remained the second largest producer of pulpwood in the Central States in 1997, with 32 percent of the region's total, or 133 thousand cords. Missouri pulpwood production increased by 5 percent from 1996.

- Missouri exported 122 thousand cords or 92 percent of the State's pulpwood production to mills in the Southern States.

[7] *Hardwood species with an average specific gravity of 0.50 or less.*

[8] *Hardwood species with an average specific gravity greater than 0.50.*

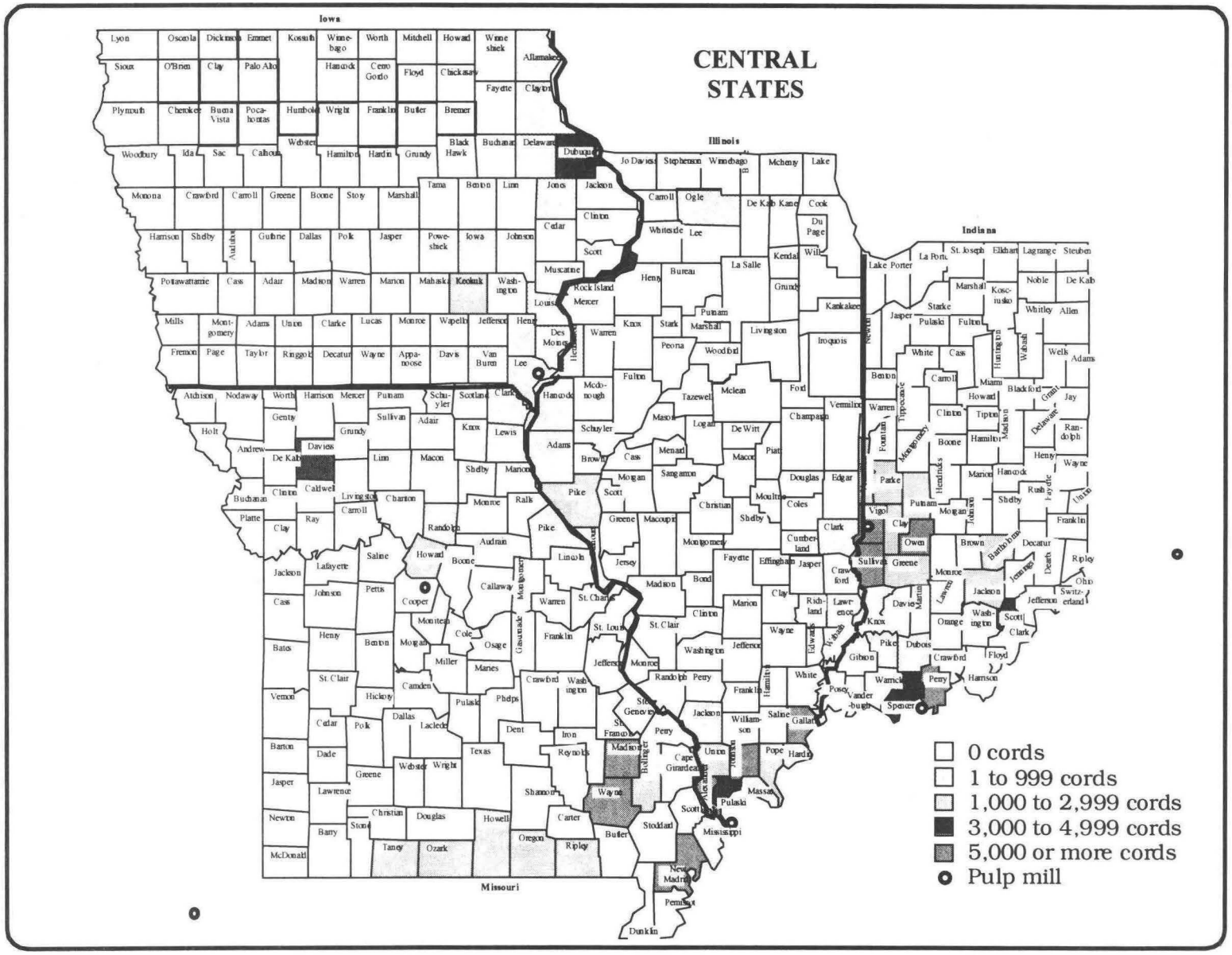

Figure 17.—*Production of pulpwood from roundwood (including chips from roundwood) in the Central States by counties, in standard cords, 1997. Locations of Central States and nearby pulp and particleboard mills using Central States pulpwood are shown.*

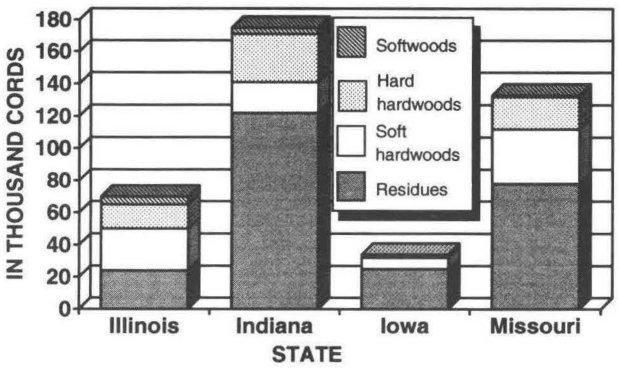

Figure 18.—*Central States pulpwood production by species group and residues, 1997.*

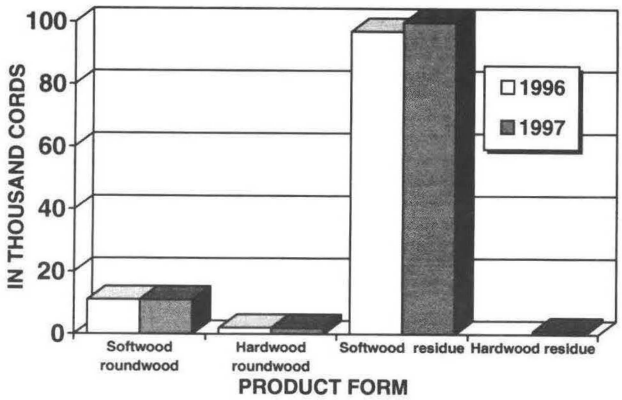

Figure 19.—*Pulpwood production in the Plains States, 1996-1997.*

RECEIPTS

- Pulp and particleboard mills in three Central States received 142 thousand cords in 1997, up 7 percent from 1996.
- Residue receipts increased by 19 percent from 70 thousand cords in 1996 to 83 thousand cords in 1997.
- Softwood roundwood was not used for pulpwood in the Central States.

INDUSTRY TRENDS AND ANALYSIS

- Average daily woodpulp production increased by only 1 percent in 1997 to 843 tons (table 6).
- In 1997, only 36 percent of the roundwood and 30 percent of the residues produced for pulpwood in the Central States went to pulp or particleboard mills located in the Central States.
- Hardwood residue from sawmills continues to be the dominant form of wood material procured for Central States pulp and particleboard mills.

PLAINS STATES

PRODUCTION AND RECEIPTS

- Pulpwood production in the Plains States was 113 thousand cords in 1997, an increase of 3 percent from 1996. Production came from Kansas, North Dakota, and South Dakota (fig. 19).
- Softwood residues accounted for 88 percent of the pulpwood production for the Plains States in 1997, all of which came from South Dakota (fig. 20).
- Fifty-one thousand cords of softwood residue from the Plains States were exported to Wisconsin in 1997.

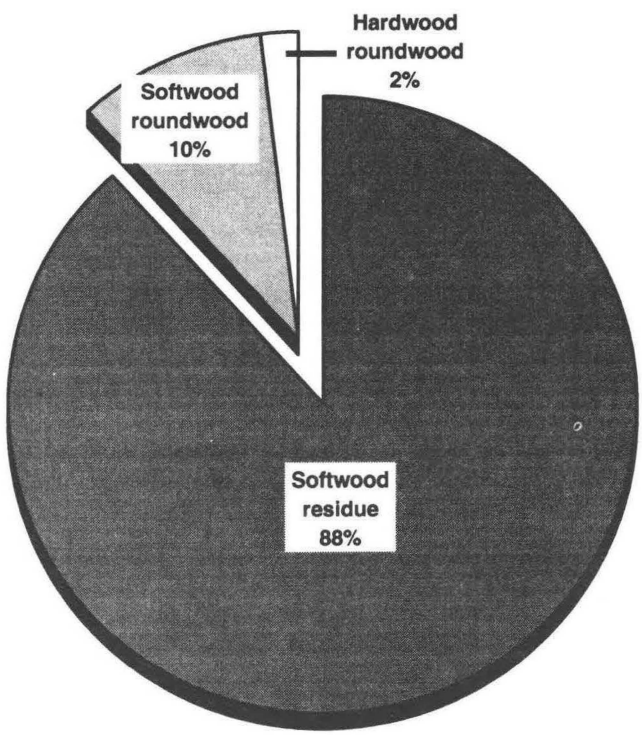

Figure 20.—*Plains States pulpwood production, 1997.*

- Two thousand cords of aspen and balsam poplar roundwood from the Plains States were exported to Minnesota in 1997.

- The Plains States imported 58 thousand cords of softwood residue from Wyoming in 1997.

- All of the pulpwood received in the Plains States was processed at Merillat Industries, Inc. (particleboard), in Rapid City, SD, which has an annual production capacity of 95 million square feet 3/4 basis.

APPENDIX

CONVERSION FACTORS USED IN THE NORTH-CENTRAL REGION

Standard cords of green roundwood per green ton:

Species	Factor	Species	Factor
Softwoods	0.4688	White birch	0.4018
Northern white-cedar	.6329	Yellow birch	.3723
Balsam fir	.4688	River birch	.3871
Hemlock	.4150	Sweetgum	.3669
Jack pine	.4688	Yellow-poplar	.4219
Red pine	.4688	Blackgum	.3779
White pine	.4777	Sycamore	.4083
Shortleaf pine	.3956	Cottonwood	.4291
Spruce	.5014	Elm	.4018
Tamarack	.4291	Hickory	.3701
Hardwoods	.3939	Hard maple	.3617
Soft hardwoods	.4171	Soft maple	.4083
Hard hardwoods	.3708	Black cherry	.4688
Ash	.4330	Red oak	.3444
Aspen	.4291	White oak	.3723
Balsam poplar	.4083	Black oak	.3444
Basswood	.5167	Other hardwoods	.4777
Beech	.3956		

Table 2.--Number of industrial pulp or particleboard plants in the Lake States by product form, species group used, and State, 1997

Product form and species group	Total Lake States	State		
		Michigan	Minnesota	Wisconsin
Roundwood				
Softwoods				
Northern white-cedar	2	2	--	--
Balsam fir	16	3	5	8
Hemlock	6	1	--	5
Jack pine	15	3	7	5
Red pine	17	3	8	6
White pine	9	2	2	5
Spruce	18	3	8	7
Tamarack	6	1	1	4
Total plants using softwoods [1]	24	4	11	9
Hardwoods				
Ash	14	6	1	7
Aspen	41	10	15	16
Balsam poplar	14	4	8	2
Basswood	15	9	1	5
Beech	7	6	--	1
White birch	23	9	6	8
Yellow birch	9	6	--	3
Cottonwood	2	--	--	2
Elm	4	--	--	4
Hickory	1	--	--	1
Hard maple	19	9	1	9
Soft maple	19	9	2	8
Red oak	13	7	--	6
White oak	7	3	--	4
Other hardwoods	6	4	--	2
Total plants using hardwoods [1]	46	11	15	20
Total plants using roundwood [1]	48	12	16	20
Residues				
Softwood	10	2	2	6
Hardwood	19	6	4	9
Total plants using residues [1]	20	6	4	10
Total plants [1]	49	12	16	21

[1] Some plants use more than one species, so numbers in columns are not additive.

Table 3.--Average daily production of active woodpulp mills in the Lake States by State, company, location, and type of pulp produced, 1997

(In tons per 24 hours)

State and company	Location	Average daily production	Type of pulp					
			Sulfite	Kraft	Groundwood/ mechanical	Semi-chemical	Thermo-chemical	Thermo-mechanical
Michigan								
ABT Co.	Alpena	250	--	--	250	--	--	--
American Fibrit Inc.	Battle Creek	4	--	--	--	--	--	4
Champion International Corp.	Quinnesec	1,150	--	1,150	--	--	--	--
Mead Corp.	Escanaba	1,500	--	1,500	--	--	--	--
Menasha Corp.	Otsego	660	--	--	--	660	--	--
S. D. Warren Co.	Muskegon	304	--	304	--	--	--	--
Stone Container Corp.	Ontonagon	530	--	--	--	530	--	--
TENNECO Packaging	Manistee	900	--	--	--	900	--	--
Total	8 mills	5,298	--	2,954	250	2,090	--	4
Minnesota								
Blandin Paper Co.	Grand Rapids	500	--	--	500	--	--	--
Boise Cascade Corp.	International Falls	976	--	976	--	--	--	--
Certain-Teed Corp.	Shakepee	242	--	--	--	--	--	242
Champion International Corp.	Sartell	800	--	--	800	--	--	--
Consolidated Papers Inc.	Duluth	331	--	--	331	--	--	--
Georgia-Pacific Corp.	Bemidji	100	--	--	100	--	--	--
Georgia-Pacific Corp.	Duluth	290	--	--	--	--	290	--
Hennepin Paper Co.	Little Falls	100	--	--	100	--	--	--
International Bildrite, Inc.	International Falls	110	--	--	110	--	--	--
Potlatch Corp.	Cloquet	520	--	520	--	--	--	--
Total	10 mills	3,969	--	1,496	1,941	--	290	242
Wisconsin								
Appleton Papers Inc.	Combined Locks	100	--	--	--	100	--	--
Consolidated Papers Inc.	Biron	208	--	--	208	--	--	--
Consolidated Papers Inc.	Niagara	317	--	--	317	--	--	--
Consolidated Papers Inc.	Stevens Point	187	--	--	187	--	--	--
Consolidated Papers Inc.	Wisconsin Rapids	1,045	--	1,045	--	--	--	--
Fraser Papers Inc.	Park Falls	170	170	--	--	--	--	--
Georgia-Pacific Corp.	Nekoosa	390	--	390	--	--	--	--
Georgia-Pacific Corp.	Phillips	75	--	--	75	--	--	--
Georgia-Pacific Corp.	Port Edwards	230	230	--	--	--	--	--
Georgia-Pacific Corp.	Superior	232	--	--	232	--	--	--
Globe Building Materials Inc.	Cornell	230	--	--	--	--	--	230
Inter Lake Papers Inc.	Kimberly	105	--	--	105	--	--	--
Mosinee Paper Corp.	Mosinee	285	--	285	--	--	--	--
TENNECO Packaging	Tomahawk	1,378	--	--	--	1,378	--	--
Thilmany Paper	Kaukauna	425	--	425	--	--	--	--
Wausau-Mosinee Paper Corp.	Brokaw	265	265	--	--	--	--	--
Weyerhaeuser Paper Co.	Rothschild	150	150	--	--	--	--	--
Total	17 mills	5,792	815	2,145	1,124	1,478	--	230
Lake States total	35 mills	15,059	815	6,595	3,315	3,568	290	476

Table 4.--Annual production of active particleboard and panel mills in the Lake States by State, company, location, and product produced, 1997

(In million square feet 3/4-inch basis)

State and company	Location	Product produced	Annual production
Michigan			
Georgia-Pacific Corp.	Gaylord	Particleboard	230
Louisiana-Pacific Corp.	Newberry	Oriented strand board	61
Louisiana-Pacific Corp.	Sagola	Oriented strand board	188
Weyerhaeuser Co.	Grayling	Oriented strand board	200
Total	4 mills		679
Minnesota			
Louisiana-Pacific Corp.	Two Harbors	Oriented strand board	61
Northwood Panelboard Co.	Solway	Oriented strand board	190
Potlatch Corp.	Bemidi	Oriented strand board	480
Potlatch Corp.	Cook	Oriented strand board	241
Potlatch Corp.	Grand Rapids	Oriented strand board	340
Trus Joist MacMillan	Deerwood	Laminated structural lumber	n/a
Total	6 mills		1,312
Wisconsin			
Louisiana-Pacific Corp.	Hayward	Oriented strand board	250
Louisiana-Pacific Corp.	Tomahawk	Oriented strand board	43
Rodman Industries	Marinette	Particleboard	15
Weyerhaeuser Co.	Marshfield	Particleboard	78
Total	4 mills		386
Lake States total	14 mills		2,377

Table 5.--Production and imports of pulpwood, Central States and Plain States, 1997 [1]

(In standard cords, unpeeled)

Product form, species group, and destination	Production by State [2]						Imports			
	Illinois	Indiana	Iowa	Missouri	Plains States [3]	Regional total	Lake States	Other U.S.	Total imports	Total receipts
Roundwood										
Softwoods										
Lake States	675	--	350	--	--	1,025	--	--	--	--
Northeastern States	--	3,953	--	--	--	3,953	--	--	--	--
Plain States	--	--	--	--	10,800	10,800	--	--	--	10,800
Southern States	3,949	--	--	1,342	--	5,290	--	--	--	--
Total	4,624	3,953	350	1,342	10,800	21,069	--	--	--	10,800
Soft hardwoods [4]										
Central States	5,632	10,883	7,110	7,213	--	30,838	--	--	--	30,838
Lake States	--	--	252	--	2,286	2,538	--	--	--	--
Northeastern States	--	117	--	--	--	117	--	--	--	--
Southern States	20,730	7,993	--	26,383	--	55,105	--	--	--	--
Total	26,361	18,993	7,362	33,596	2,286	88,597	--	--	--	30,838
Hard hardwoods [5]										
Central States	3,044	22,244	2,018	325	--	27,631	--	--	--	27,631
Lake States	--	--	380	--	--	380	--	--	--	--
Northeastern States	--	53	--	--	--	53	--	--	--	--
Southern States	11,652	7,343	--	19,758	--	38,753	--	--	--	--
Total	14,697	29,640	2,398	20,083	--	66,817	--	--	--	27,631
Total roundwood										
Central States	8,676	33,126	9,128	7,538	--	58,468	--	--	--	58,468
Lake States	675	--	981	--	2,286	3,942	--	--	--	--
Northeastern States	--	4,124	--	--	--	4,124	--	--	--	--
Plain States	--	--	--	--	10,800	10,800	--	--	--	10,800
Southern States	36,330	15,336	--	47,482	--	99,148	--	--	--	--
Total	45,681	52,586	10,109	55,020	13,086	176,483	--	--	--	69,268
Residues										
Softwoods										
Central States	--	--	15,120	--	--	15,120	--	6,480	6,480	21,600
Lake States	--	--	88	--	50,685	50,773	--	--	--	--
Plain States	--	--	--	--	48,839	48,839	--	58,000	58,000	106,839
Southern States	--	249	--	3,802	--	4,052	--	--	--	--
Total	--	249	15,208	3,802	99,524	118,784	--	64,480	64,480	128,439
Hardwoods										
Central States	12,618	36,872	7,359	3,091	--	59,940	1,492	--	1,492	61,432
Lake States	--	15,529	2,661	--	--	18,190	--	--	--	--
Northeastern States	--	1,503	--	--	--	1,503	--	--	--	--
Southern States	11,685	67,767	--	70,712	443	150,607	--	--	--	--
Total	24,303	121,670	10,020	73,803	443	230,239	1,492	--	1,492	61,432
Total residues										
Central States	12,618	36,872	22,479	3,091	--	75,060	1,492	6,480	7,972	83,032
Lake States	--	15,529	2,749	--	50,685	68,963	--	--	--	--
Northeastern States	--	1,503	--	--	--	1,503	--	--	--	--
Plain States	--	--	--	--	48,839	48,839	--	58,000	58,000	106,839
Southern States	11,685	68,016	--	74,514	443	154,658	--	--	--	--
Total	24,303	121,920	25,228	77,605	99,967	349,023	1,492	64,480	65,972	189,871
Total all wood material										
Central States	21,294	69,998	31,607	10,629	--	133,529	1,492	6,480	7,972	141,500
Lake States	675	15,529	3,730	--	52,971	72,905	--	--	--	--
Northeastern States	--	5,626	--	--	--	5,626	--	--	--	--
Plain States	--	--	--	--	59,639	59,639	--	58,000	58,000	117,639
Southern States	48,015	83,352	--	121,996	443	253,807	--	--	--	--
Total	69,984	174,506	35,337	132,625	113,054	525,506	1,492	64,480	65,972	259,140

[1] Table may not add due to rounding.

[2] Vertical columns of figures under the box heading "Production by State" present the amount of roundwood cut or residue generated in each State.

[3] Includes Kansas, Nebraska, South Dakota, and North Dakota.

[4] Hardwood species with an average specific gravity of 0.50 of less.

[5] Hardwood species with an average specific gravity greater than 0.50.

Table 6. -Average daily production of active woodpulp mills in the Central States by company, location, and type of pulp produced, 1997

(In tons per 24 hours)

Company	Location	Average daily production	Type of pulp	
			Groundwood/ Mechanical	Semi-chemical
The Weston Paper and Mfg. Co.	Terre Haute, Indiana	570	--	570
Four M Paper Corp.	Fort Madison, Iowa	118	--	118
Jeld-Wen Fiber of Iowa	Dubuque, Iowa	80	80	--
Huebert Fiberboard Co.	Boonville, Missouri	75	75	--
Central States total	4 mills	843	155	688

Table 7.--Lake States pulpwood production by State of origin, year, and destination, 1993-1997

(In thousand standard cords, unpeeled) [1]

MICHIGAN

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other [2]
1993	3,154	2,859	11	272	13
1994	3,254	2,915	17	310	11
1995	3,112	2,733	18	346	16
1996	3,111	2,815	5	267	25
1997	3,346	3,104	1	223	18
5-year average	3,195	2,885	10	284	17

MINNESOTA

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other [2]
1993	2,969	--	2,783	146	39
1994	3,029	11	2,812	164	41
1995	2,971	4	2,738	178	50
1996	3,065	--	2,676	352	38
1997	2,980	--	2,654	287	39
5-year average	3,003	3	2,733	225	41

WISCONSIN

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other [2]
1993	3,270	244	55	2,970	1
1994	3,465	241	55	3,167	2
1995	3,482	231	80	3,168	2
1996	3,309	218	68	3,020	3
1997	3,194	234	45	2,913	2
5-year average	3,344	234	61	3,048	2

[1] Includes mill residues used for pulp.

[2] Includes Canada.

Table 8.--Lake States pulpwood production by State of origin, product form, Forest Survey Unit, and destination, 1997

(In thousand standard cords, unpeeled)

MICHIGAN

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other [1]
Roundwood					
Eastern Upper Peninsula	633	590	--	35	8
Western Upper Peninsula	1,193	1,039	1	149	3
Northern Lower Peninsula	1,178	1,167	--	10	2
Southern Lower Peninsula	95	95	--	--	--
Total	3,099	2,891	1	194	13
Residues	247	213	--	29	5
Total pulpwood	3,346	3,104	1	223	18

MINNESOTA

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other [1]
Roundwood					
Aspen-Birch	1,046	--	913	133	--
Northern Pine	1,501	--	1,445	56	--
Central Hardwood	277	--	189	88	--
Prairie	52	--	52	--	--
Total	2,875	--	2,599	277	--
Residues	104	--	55	11	39
Total pulpwood	2,980	--	2,654	287	39

WISCONSIN

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other [1]
Roundwood					
Northeastern	980	190	*	789	--
Northwestern	1,134	13	38	1,083	--
Central	577	*	1	576	--
Southwestern	80	--	1	80	--
Southeastern	40	7	--	32	--
Total	2,811	211	40	2,560	--
Residues	383	23	5	353	2
Total pulpwood	3,194	234	45	2,913	2

* Less than 500 standard cords, unpeeled.

[1] Includes Canada.

Table 9.--Lake States annual pulpwood production from roundwood by State, Forest Survey Unit, and species group, 1993-1997

(In thousand standard cords, unpeeled)

Forest Survey Unit	All species					Pine					Spruce				
	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997
MICHIGAN															
Eastern Upper Peninsula	778	773	774	689	633	149	111	147	126	131	27	23	27	27	18
Western Upper Peninsula	1,051	1,140	1,149	1,217	1,193	115	101	99	106	97	39	38	39	50	27
Northern Lower Peninsula	1	1,035	845	861	1,178	116	132	108	141	163	2	1	1	1	1
Southern Lower Peninsula	64	65	66	67	95	*	*	*	*	2	--	--	--	*	--
Total	2,909	3,013	2,834	2,834	3,099	380	344	355	373	392	67	62	66	78	46
MINNESOTA															
Aspen-Birch	1,330	1,318	1,263	1,321	1,046	56	46	40	38	35	125	137	118	158	123
Northern Pine	1,341	1,283	1,263	1,232	1,501	81	60	65	51	66	33	29	31	44	43
Central Hardwood	163	222	242	296	277	20	14	17	29	26	1	1	1	3	3
Prairie	23	35	43	48	52	*	--	--	--	--	--	--	--	*	--
Total	2,857	2,858	2,810	2,897	2,875	156	120	122	119	126	158	165	150	204	168
WISCONSIN															
Northeast	1,054	1,066	1,020	1,003	980	141	135	132	158	173	13	12	16	16	18
Northwest	1,221	1,312	1,334	1,210	1,134	225	242	228	231	205	19	16	19	18	22
Central	575	640	661	618	577	277	307	285	264	270	1	1	3	1	2
Southwest	58	65	65	75	80	34	38	33	39	39	1	1	2	1	1
Southeast	30	38	35	40	40	15	15	17	20	23	*	1	1	1	1
Total	2,937	3,121	3,115	2,945	2,811	692	738	695	712	709	34	31	40	34	44
Total Lake States	8,703	8,992	8,759	8,676	8,785	1,228	1,201	1,172	1,203	1,228	259	258	256	318	259

(Table 9 continued on next page)

(Table 9 continued)

MICHIGAN

Forest Survey Unit	Balsam fir					Other softwoods					Aspen				
	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997
Eastern Upper Peninsula	55	55	34	25	20	25	43	30	32	24	211	181	192	152	125
Western Upper Peninsula	44	45	43	38	29	24	41	46	53	57	373	360	368	334	339
Northern Lower Peninsula	3	2	2	2	2	*	*	*	*	*	545	527	429	406	540
Southern Lower Peninsula	--	--	--	*	--	--	*	--	*	--	13	16	13	22	38
Total	101	103	79	65	52	49	84	76	85	82	1,142	1,084	1,003	913	1,041
MINNESOTA															
Aspen-Birch	114	114	119	171	106	2	2	11	11	12	925	862	831	816	649
Northern Pine	84	70	76	75	79	1	1	2	2	8	1,105	1,061	1,021	988	1,187
Central Hardwood	2	1	2	6	10	--	--	*	--	1	131	197	209	247	222
Prairie	11	--	--	*	--	--	--	*	--	--	23	35	43	47	50
Total	199	185	198	252	195	3	3	12	13	21	2,185	2,155	2,103	2,098	2,108
WISCONSIN															
Northeast	30	31	30	41	32	20	32	27	26	24	405	393	397	367	328
Northwest	31	31	41	50	44	9	9	7	7	8	544	573	614	539	481
Central	1	*	1	1	1	2	2	2	2	3	152	163	179	170	149
Southwest	*	*	*	*	*	*	--	*	*	*	18	17	17	24	17
Southeast	*	*	1	*	*	*	*	*	*	*	10	13	8	11	5
Total	61	63	73	92	78	31	42	37	36	34	1,129	1,159	1,214	1,109	980
Total Lake States	361	351	350	410	324	83	129	125	135	138	4,455	4,399	4,320	4,121	4,130

(Table 9 continued on next page)

(Table 9 continued)

Forest Survey Unit	Birch					Maple					Other hardwoods				
	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997
MICHIGAN															
Eastern Upper Peninsula	64	75	51	77	51	193	215	237	203	221	55	71	57	48	42
Western Upper Peninsula	81	87	84	144	87	280	351	375	370	430	95	117	94	122	126
Northern Lower Peninsula	51	50	42	35	40	143	163	156	188	266	156	160	106	88	165
Southern Lower Peninsula	2	1	*	*	1	14	8	11	16	23	36	40	42	28	32
Total	197	213	177	256	180	630	736	779	777	940	342	387	299	287	365
MINNESOTA															
Aspen-Birch	27	44	65	58	60	11	10	9	5	9	72	103	70	65	51
Northern Pine	11	30	38	45	55	7	10	4	1	1	20	23	27	26	63
Central Hardwood	3	1	8	7	8	4	6	4	4	5	2	2	*	1	3
Prairie	--	--	*	*	*	--	--	--	--	--	*	--	1	*	2
Total	42	75	111	109	123	21	26	17	9	15	94	128	97	92	119
WISCONSIN															
Northeast	129	116	123	120	106	209	226	194	152	178	107	121	101	124	122
Northwest	114	126	152	123	119	170	205	172	158	165	108	110	101	83	89
Central	17	18	28	27	24	49	60	59	64	51	77	89	104	90	77
Southwest	1	1	3	3	5	2	4	5	4	7	2	5	6	5	11
Southeast	*	1	2	1	2	2	2	3	2	4	3	5	3	3	4
Total	261	263	309	275	257	431	496	433	379	405	298	329	315	306	304
Total Lake States	500	550	596	641	559	1,083	1,259	1,229	1,165	1,360	734	845	711	684	788

* Less than 500 standard cords.

Table 10.--Pulpwood production from roundwood by Forest Survey Unit, county, and species group, Michigan, 1997

(In standard cords, unpeeled)

Forest Survey Unit and county [1]	All species	Species group										
		N. white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Eastern Upper Peninsula												
Alger	111,445	530	3,255	2,783	8,204	4,151	605	1,553	355	1,305	12,638	1,301
Chippewa	95,528	577	4,008	2,686	17,621	11,578	606	2,713	369	375	24,259	549
Delta	91,489	602	3,876	3,584	11,075	6,733	675	2,020	403	484	22,836	2,091
Luce	69,239	94	1,013	5,187	9,853	6,772	98	1,355	63	625	6,247	563
Mackinac	89,355	296	3,196	2,153	5,614	4,393	251	2,379	160	510	28,547	1,188
Menominee	65,059	157	1,457	728	984	1,143	278	3,060	105	702	16,021	1,848
Schoolcraft	110,878	482	3,442	2,784	21,674	18,151	503	4,694	323	571	14,206	1,544
Total	632,994	2,739	20,246	19,905	75,024	52,921	3,017	17,774	1,777	4,572	124,753	9,083
Western Upper Peninsula												
Baraga	125,184	345	3,222	10,149	11,794	2,081	547	3,375	287	1,592	20,228	2,933
Dickinson	113,541	451	2,915	2,430	7,254	2,139	523	3,375	368	726	53,963	5,036
Gogebic	92,087	4	1,120	4,768	208	306	88	805	70	2,188	16,019	1,336
Houghton	186,406	132	2,785	4,207	4,344	2,900	478	3,577	269	5,820	51,343	4,456
Iron	175,001	758	8,526	4,207	8,877	6,824	1,281	6,900	972	1,500	53,591	5,718
Keweenaw	47,494	65	390	1,975	345	242	68	143	43	923	6,353	529
Marquette	290,741	1,469	9,254	20,875	32,979	9,565	1,532	7,564	1,561	1,666	67,705	7,588
Ontonagon	162,049	18	1,091	1,938	837	1,606	161	1,495	51	4,558	69,935	3,294
Total	1,192,502	3,241	29,303	50,550	66,638	25,663	4,677	27,232	3,622	18,972	339,138	30,889
Northern Lower Peninsula												
Alcona	30,868	--	--	--	3,124	165	31	--	--	222	16,365	--
Alpena	14,712	--	124	--	179	73	--	164	--	13	9,244	--
Antrim	13,051	--	--	--	633	398	6	--	--	315	4,749	6
Arenac	5,071	--	--	--	302	--	--	--	--	1	3,874	--
Bay	2,641	--	--	--	--	8	--	--	--	--	2,124	--
Benzie	31,381	--	--	--	2,041	273	14	--	--	1,282	9,008	37
Charlevoix	4,751	--	--	--	748	48	8	--	--	135	1,744	2
Cheboygan	43,144	39	591	--	7,924	1,354	69	281	--	54	20,812	--
Clare	54,969	--	--	--	3,373	525	10	--	--	515	26,821	11
Crawford	48,748	--	--	--	18,527	5,716	238	--	--	75	16,631	1
Emmet	31,366	7	54	--	2,590	428	25	13	--	106	10,375	--
Gladwin	52,281	--	--	--	2,579	547	9	--	--	666	24,721	--
Grand Traverse	22,922	--	--	--	4,079	1,208	27	--	--	479	9,082	25
Iosco	17,615	--	--	--	8,272	1,328	78	--	--	37	5,414	--
Isabella	28,729	--	--	--	252	32	--	--	--	519	15,946	--
Kalkaska	54,277	34	206	178	9,452	7,639	51	76	23	732	19,283	20
Lake	70,112	--	--	--	1,472	435	--	--	--	905	27,046	26
Leelanau	1,893	--	--	--	464	38	2	--	--	88	303	--
Manistee	46,035	--	--	--	1,269	473	--	--	--	921	18,585	47
Mason	13,889	--	--	--	--	--	--	--	--	526	5,198	17
Mecosta	54,309	--	--	--	1,005	684	--	--	--	962	33,834	1
Midland	23,390	--	--	--	41	--	--	--	--	506	9,795	21
Missaukee	48,985	--	--	--	2,841	2,428	--	--	--	720	21,810	15
Montmorency	48,338	34	371	--	7,764	704	75	196	--	86	27,210	--
Newaygo	66,093	--	--	--	62	100	--	--	--	1,099	33,275	18
Oceana	18,392	--	--	--	--	--	--	--	--	308	9,583	2
Ogemaw	20,279	--	--	--	6,536	782	29	--	--	66	6,539	2
Osceola	80,730	--	--	--	272	635	--	--	--	1,671	48,583	42
Oscoda	30,321	--	--	--	7,848	177	63	--	--	9	15,409	--
Otsego	67,939	--	--	--	20,972	1,868	214	--	--	176	25,420	--
Presque Isle	43,043	7	441	--	3,456	978	38	440	--	45	20,194	1
Roscommon	47,652	69	553	--	10,045	410	82	132	--	197	22,781	2
Wexford	39,963	--	--	--	1,388	2,854	--	--	--	728	17,978	30
Total	1,177,890	190	2,341	178	129,511	32,307	1,066	1,302	23	14,166	539,736	327
Southern Lower Peninsula												
Allegan	15,945	--	--	--	--	--	--	--	--	11	3,955	--
Barry	3,920	--	--	--	--	--	--	--	--	11	1,304	--
Calhoun	1,649	--	--	--	--	--	--	--	--	--	370	--
Cass	2,271	--	--	--	--	--	--	--	--	--	509	--
Clinton	1,073	--	--	--	865	4	9	--	--	1	100	--
Gratiot	8,412	--	--	--	--	--	--	--	--	160	4,808	--
Huron	1,647	--	--	--	--	--	--	--	--	32	935	--
Ionia	641	--	--	--	--	--	--	--	--	--	144	--
Jackson	1,100	--	--	--	--	--	--	--	--	7	442	--
Kalamazoo	1,223	--	--	--	--	--	--	--	--	1	291	--
Kent	14,241	--	--	--	--	--	--	--	--	85	3,949	--
Lapeer	100	--	--	--	22	--	--	--	--	--	78	--
Monroe	922	--	--	--	--	--	--	--	--	18	323	--
Montcalm	16,205	--	--	--	--	--	--	--	--	294	9,122	--
Muskegon	14,353	--	--	--	--	--	--	--	--	134	5,985	--
Ottawa	5,611	--	--	--	--	--	--	--	--	43	2,932	--
Sanilac	1,563	--	--	--	--	165	--	--	--	--	692	--
St. Joseph	1,404	--	--	--	--	--	--	--	--	--	315	--
Tuscola	1,585	--	--	--	550	--	--	--	--	--	1,025	--
Van Buren	1,541	--	--	--	--	--	--	--	--	--	346	--
Total	95,405	--	--	--	1,437	169	9	--	--	797	37,626	--
State total	3,098,792	6,170	51,889	70,633	272,611	111,059	8,769	46,308	5,422	38,507	1,041,253	40,300

(Table 10 continued on next page)

(Table 10 continued)

Forest Survey Unit and county [1]	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Eastern Upper Peninsula												
Alger	1,634	3,222	7,430	2,363	1	1	--	36,286	20,934	608	4	2,283
Chippewa	726	870	5,208	689	--	--	--	10,183	11,759	112	1	639
Delta	1,028	1,187	5,444	1,282	1	--	--	16,285	10,521	182	2	1,178
Luce	737	1,559	3,515	1,211	--	--	--	18,055	10,848	284	--	1,160
Mackinac	918	1,235	8,118	1,154	--	--	--	15,550	12,451	174	--	1,069
Menominee	1,091	1,392	7,276	1,109	--	9	2	16,444	9,815	357	40	1,044
Schoolcraft	867	1,382	5,004	1,589	--	1	--	19,247	12,756	203	5	1,448
Total	7,002	10,846	41,995	9,396	3	11	2	132,049	89,084	1,920	52	8,821
Western Upper Peninsula												
Baraga	2,129	2,231	10,397	2,282	--	26	--	30,193	18,676	611	147	1,940
Dickinson	1,986	1,073	7,582	877	--	254	10	13,024	8,196	497	48	814
Gogebic	2,215	2,875	4,762	1,802	6	75	54	31,947	17,451	1,965	145	1,879
Houghton	10,399	2,944	7,131	4,099	1	8	--	52,243	25,909	1,249	44	2,069
Iron	2,785	2,748	9,810	2,396	1	24	4	34,017	21,007	731	118	2,209
Keweenaw	1,212	1,549	4,251	1,087	--	3	--	17,545	9,424	366	19	961
Marquette	3,474	4,034	19,752	4,524	--	3	--	55,553	36,879	608	17	4,137
Ontonagon	7,990	2,305	3,278	2,918	2	18	10	39,075	18,738	1,222	49	1,460
Total	32,190	19,757	66,964	19,985	10	410	78	273,596	156,281	7,249	587	15,469
Northern Lower Peninsula												
Alcona	1,108	333	2,478	222	--	--	--	4,304	2,401	116	--	--
Alpena	66	19	1,035	13	--	--	--	3,244	539	--	--	--
Antrim	1,114	106	678	28	--	--	--	1,803	2,057	612	506	39
Arenac	5	2	378	1	--	--	--	40	468	--	--	--
Bay	1	--	82	--	--	--	--	4	421	--	--	--
Benzie	1,675	661	715	99	--	--	--	4,614	4,521	2,860	3,108	475
Charlevoix	227	78	140	20	--	--	--	441	490	321	326	22
Cheboygan	421	99	1,665	--	--	--	--	6,387	3,228	219	--	--
Clare	1,243	695	1,602	227	--	--	--	4,779	6,540	4,344	4,244	40
Crawford	480	117	578	31	--	--	--	1,678	3,346	1,332	--	--
Emmet	463	154	2,140	5	--	--	--	9,783	5,091	81	44	4
Gladwin	1,556	926	2,800	297	--	--	--	5,340	7,264	2,718	2,822	35
Grand Traverse	817	263	495	78	--	--	--	1,718	2,209	1,152	1,187	104
Iosco	225	55	787	37	--	--	--	518	734	131	--	--
Isabella	1,060	620	1,078	180	--	--	--	4,182	3,749	309	722	79
Kalkaska	1,326	648	1,308	147	--	--	--	4,435	7,359	589	545	225
Lake	1,403	975	954	382	--	--	--	5,493	9,412	8,375	12,966	266
Leelanau	141	47	32	6	--	--	--	411	333	--	--	27
Manistee	1,152	778	1,062	250	--	--	--	4,692	7,295	4,181	4,978	353
Mason	586	353	271	76	--	--	--	2,228	2,821	615	966	232
Mecosta	548	948	503	469	--	--	--	5,019	8,951	473	899	13
Midland	698	367	902	83	--	--	--	2,245	3,355	2,576	2,618	183
Missaukee	1,509	760	1,387	215	--	--	--	4,987	7,990	2,093	2,078	152
Montmorency	1,542	133	1,457	74	--	--	--	3,626	2,909	2,158	--	--
Newaygo	659	989	605	458	--	--	--	5,183	10,967	5,657	6,914	107
Oceana	171	290	165	139	--	--	--	1,491	2,965	1,250	2,010	18
Ogemaw	173	47	262	17	--	--	--	503	2,118	1,593	1,588	24
Osceola	1,071	1,433	1,091	643	--	--	--	7,735	12,928	1,948	2,445	233
Oscoda	528	16	1,383	1	--	--	--	1,604	2,127	1,157	--	--
Otsego	2,274	291	3,095	46	--	--	--	3,914	7,320	1,015	1,334	--
Presque Isle	378	83	2,571	1	--	--	--	10,941	2,999	470	--	--
Roscommon	452	258	1,121	67	--	--	--	1,431	6,253	3,176	603	20
Wexford	977	629	769	211	--	--	--	4,248	6,258	1,768	1,859	267
Total	26,050	13,172	35,588	4,524	--	--	--	119,020	147,419	53,287	54,764	2,920
Southern Lower Peninsula												
Allegan	11	56	11	11	--	--	--	169	3,279	4,011	4,431	--
Barry	11	55	11	11	--	--	--	165	767	761	823	--
Calhoun	--	--	--	--	--	--	--	--	352	445	481	--
Cass	--	--	--	--	--	--	--	--	485	614	663	--
Clinton	4	2	24	--	--	--	--	13	51	--	--	--
Gratiot	80	160	160	80	--	--	--	1,042	1,522	120	280	--
Huron	79	32	158	47	--	--	--	158	206	--	--	--
Ionia	--	--	--	--	--	--	--	--	137	173	188	--
Jackson	7	36	7	7	--	--	--	109	109	113	263	--
Kalamazoo	3	2	3	1	--	--	--	12	257	313	339	--
Kent	42	85	42	42	--	--	--	424	1,898	2,841	4,834	--
Lapeer	--	--	--	--	--	--	--	--	--	--	--	--
Monroe	92	28	92	18	--	--	--	231	120	--	--	--
Montcalm	147	294	294	147	--	--	--	1,910	3,021	380	596	--
Muskegon	68	134	73	67	--	--	--	673	2,698	2,126	2,394	--
Ottawa	43	217	43	43	--	--	--	651	923	344	372	--
Sanilac	12	--	103	--	--	--	--	8	583	--	--	--
St. Joseph	--	--	--	--	--	--	--	--	300	380	410	--
Tuscola	--	--	--	--	--	--	--	10	--	--	--	--
Van Buren	--	--	--	--	--	--	--	--	329	416	450	--
Total	599	1,101	1,021	474	--	--	--	5,575	17,035	13,037	16,525	--
State total	65,842	44,877	145,568	34,378	13	420	81	530,240	409,819	75,493	71,928	27,210

[1] Includes only those counties that supplied pulpwood in 1997.

Table 11.--Pulpwood production from roundwood by Forest Survey Unit, county, and species group, Minnesota, 1997

(In standard cords, unpeeled)

Forest Survey Unit and county [1]	All species	Species group										
		N. white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Aspen-Birch												
Carlton	42,186	--	1,122	--	817	821	--	2,376	32	296	26,292	738
Cook	53,414	--	2,492	--	2,524	492	21	6,490	319	--	39,034	--
Koochiching	337,022	--	31,276	--	8,221	178	--	41,294	5,713	78	221,850	25,352
Lake	93,158	--	11,589	--	3,405	835	11	18,219	990	1,044	34,641	8,799
St. Louis	520,144	--	59,406	--	14,619	2,446	254	54,491	5,296	361	327,578	14,284
Total	1,045,923	--	105,885	--	29,586	4,772	286	122,869	12,350	1,779	649,397	49,172
Northern Pine												
Aitkin	98,683	--	4,874	--	1,226	1,073	24	2,239	1,266	--	81,099	980
Becker	82,974	--	730	--	382	22	--	9	--	--	78,682	996
Beltrami	209,566	--	5,053	--	3,094	2,471	--	3,721	1,076	844	164,648	17,323
Cass	212,375	--	6,019	--	9,388	4,913	779	3,294	1,183	--	171,118	4,864
Clearwater	92,017	--	2,121	--	1,270	26	--	1,405	56	103	79,275	4,189
Crow Wing	90,740	--	871	--	7,015	2,851	41	848	50	--	74,661	1,070
Hubbard	143,903	--	567	--	2,863	418	--	407	120	79	129,220	3,083
Itasca	393,028	--	54,440	--	9,126	3,012	35	21,364	1,689	118	273,602	16,601
Lake of the Woods	114,396	--	3,608	--	6,032	28	--	7,409	1,217	--	87,937	8,131
Mahnomen	13,789	--	--	--	--	--	--	60	--	--	13,646	69
Roseau	25,181	--	336	--	2,816	--	--	2,146	1,371	--	15,850	2,653
Wadena	24,410	--	--	--	6,017	1,030	--	--	29	--	17,168	71
Total	1,501,063	--	78,621	--	49,229	15,844	878	42,902	8,056	1,144	1,186,905	60,029
Central Hardwood												
Anoka	5,590	--	--	--	2,100	1,758	29	104	--	50	1,079	--
Benton	7,420	--	7,231	--	--	73	--	--	--	--	116	--
Chisago	3,571	--	--	--	111	1,833	52	159	--	181	64	--
Douglas	10	--	--	--	--	--	--	--	--	--	10	--
Goodhue	531	--	--	--	--	334	122	--	--	--	75	--
Isanti	6,015	--	--	--	30	5,110	20	219	--	--	623	--
Kanabec	15,674	--	--	--	--	695	--	--	--	1	14,646	12
Mille Lacs	56,402	--	--	--	394	470	4	11	--	--	55,421	2
Morrison	24,154	--	--	--	1,682	2,229	--	682	731	--	18,659	45
Olmsted	151	--	--	--	--	151	--	--	--	--	--	--
Otter Tail	28,369	--	--	--	--	25	--	--	--	--	27,831	429
Pine	119,939	--	2,692	--	1,853	3,694	43	1,333	--	202	98,269	732
Sherburne	1,653	--	411	--	57	973	17	50	--	6	101	--
Stearns	1,470	--	--	--	--	--	--	--	--	--	1,470	--
Todd	3,224	--	--	--	29	39	--	--	--	--	3,132	24
Wabasha	960	--	--	--	141	446	34	--	--	--	339	--
Washington	265	--	--	--	--	--	--	--	--	21	--	--
Winona	1,243	--	--	--	415	620	15	142	--	5	13	--
Total	276,641	--	10,335	--	6,812	18,451	336	2,701	731	467	221,847	1,244
Prairie												
Kittson	9,794	--	--	--	--	--	--	--	--	--	9,619	175
Marshall	17,371	--	--	--	--	--	--	--	--	--	16,128	1,242
Norman	8,644	--	--	--	--	--	--	--	--	--	8,639	5
Pennington	5,361	--	--	--	--	--	--	--	--	--	5,277	84
Polk	7,191	--	--	--	--	--	--	--	--	--	7,012	179
Red Lake	3,434	--	--	--	--	--	--	--	--	--	3,392	15
Total	51,796	--	--	--	--	--	--	--	--	--	50,067	1,699
State total	2,875,422	--	194,841	--	85,628	39,067	1,500	168,472	21,137	3,390	2,108,216	112,145

(Table 11 continued on next page)

(Table 11 continued)

Forest Survey Unit and county [1]	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Aspen-Birch												
Carlton	88	--	7,953	--	--	12	11	608	711	264	12	30
Cook	--	--	2,043	--	--	--	--	--	--	--	--	--
Koochiching	--	--	2,904	--	--	--	--	26	130	--	--	--
Lake	--	--	12,219	--	--	--	--	1,405	--	--	--	--
St. Louis	--	--	35,181	--	--	--	--	4,026	2,192	10	--	--
Total	88	--	60,299	--	--	12	11	6,065	3,034	275	12	30
Northern Pine												
Aitkin	--	--	5,794	--	--	--	--	108	--	--	--	--
Becker	--	--	2,154	--	--	--	--	--	--	--	--	--
Beltrami	1,135	--	9,661	--	--	--	--	--	540	--	--	--
Cass	63	--	10,753	--	--	--	--	--	--	--	--	--
Clearwater	786	--	2,786	--	--	--	--	--	--	--	--	--
Crow Wing	--	--	3,334	--	--	--	--	--	--	--	--	--
Hubbard	--	--	7,099	--	--	--	--	--	48	--	--	--
Itasca	--	--	12,808	--	--	--	--	40	196	--	--	--
Lake of the Woods	--	--	33	--	--	--	--	--	--	--	--	--
Mahnomen	--	--	14	--	--	--	--	--	--	--	--	--
Roseau	--	--	8	--	--	--	--	--	--	--	--	--
Wadena	--	--	95	--	--	--	--	--	--	--	--	--
Total	1,984	--	54,539	--	--	--	--	148	784	--	--	--
Central Hardwood												
Anoka	--	--	259	--	--	--	--	19	83	82	27	--
Benton	--	--	--	--	--	--	--	--	--	--	--	--
Chisago	88	--	338	--	--	12	11	252	162	264	12	30
Douglas	--	--	--	--	--	--	--	--	--	--	--	--
Goodhue	--	--	--	--	--	--	--	--	--	--	--	--
Isanti	--	--	--	--	--	--	--	--	--	10	3	--
Kanabec	--	--	276	--	--	--	--	--	44	--	--	--
Mille Lacs	--	--	17	--	--	--	--	--	82	--	--	--
Morrison	--	--	125	--	--	--	--	--	--	--	--	--
Olmsted	--	--	--	--	--	--	--	--	--	--	--	--
Otter Tail	--	--	84	--	--	--	--	--	--	--	--	--
Pine	204	--	6,544	--	--	12	11	1,653	2,386	267	12	30
Sherburne	--	--	24	--	--	--	--	2	11	--	--	--
Stearns	--	--	--	--	--	--	--	--	--	--	--	--
Todd	--	--	--	--	--	--	--	--	--	--	--	--
Wabasha	--	--	--	--	--	--	--	--	--	--	--	--
Washington	--	--	202	--	--	--	--	7	34	--	--	--
Winona	--	--	14	--	--	--	--	8	13	--	--	--
Total	292	--	7,883	--	--	25	23	1,941	2,816	624	53	59
Prairie												
Kittson	--	--	--	--	--	--	--	--	--	--	--	--
Marshall	--	--	2	--	--	--	--	--	--	--	--	--
Norman	--	--	--	--	--	--	--	--	--	--	--	--
Pennington	--	--	--	--	--	--	--	--	--	--	--	--
Polk	--	--	--	--	--	--	--	--	--	--	--	--
Red Lake	--	--	28	--	--	--	--	--	--	--	--	--
Total	--	--	30	--	--	--	--	--	--	--	--	--
State total	2,364	--	122,750	--	1	37	34	8,154	6,634	899	65	89

[1] Includes only those counties that supplied pulpwood in 1997.

Table 12.--Pulpwood production from roundwood by Forest Survey Unit, county, and species group, Wisconsin, 1997

(In standard cords, unpeeled)

Forest Survey Unit and county [1]	All species	Species group										
		N. white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Northeastern												
Florence	51,793	14	1,084	5,209	2,426	4,904	273	797	114	787	16,705	809
Forest	121,110	--	4,153	1,714	980	4,357	519	2,948	85	5,362	35,111	1,250
Langlade	126,500	--	7,333	994	190	3,667	267	2,529	582	5,688	44,303	250
Lincoln	125,302	--	2,992	758	2,751	6,073	447	1,008	232	5,089	53,574	179
Marinette	102,599	--	1,414	232	21,973	17,505	1,573	468	387	1,323	32,160	1,278
Menominee	75,860	448	2,799	9,071	4,246	8,106	2,573	1,127	300	3,710	23,888	476
Oconto	59,718	--	1,550	282	2,418	7,918	516	2,536	12	610	29,515	734
Oneida	133,914	--	6,310	375	8,119	11,603	2,493	4,727	609	4,483	42,787	247
Shawano	23,687	--	106	983	71	3,279	156	61	82	1,187	13,291	2
Vilas	159,890	--	4,517	752	39,956	11,018	2,256	1,629	343	4,819	36,233	339
Total	980,373	462	32,257	20,369	83,131	78,429	11,072	17,832	2,746	33,058	327,569	5,563
Northwestern												
Ashland	72,784	--	5,177	218	210	2,182	664	7,334	433	2,452	31,642	4
Barron	16,812	--	11	71	55	1,326	229	53	26	397	9,907	2
Bayfield	177,236	--	4,927	82	42,651	8,421	888	2,403	559	2,817	76,121	145
Burnett	64,324	--	259	27	24,240	7,183	232	303	11	394	25,217	2
Douglas	185,356	--	12,514	14	39,975	21,626	217	2,893	104	2,035	67,814	208
Iron	108,616	--	4,071	391	561	1,286	306	1,975	168	3,000	59,458	12
Polk	24,861	--	66	--	6,149	1,740	132	159	--	304	11,770	5
Price	116,409	--	7,338	978	6,064	3,762	716	1,725	2,416	5,195	37,819	72
Rusk	71,432	--	644	73	256	1,059	45	527	360	2,624	36,933	32
Sawyer	157,092	--	5,815	384	1,849	5,427	1,079	4,012	528	6,761	60,356	12
Taylor	64,411	--	2,520	885	20	1,377	117	513	503	3,211	24,831	12
Washburn	74,653	--	1,142	--	12,059	10,560	391	194	36	688	38,972	5
Total	1,133,985	--	44,484	3,124	134,091	65,950	5,016	22,090	5,145	29,879	480,840	512
Central												
Adams	69,881	--	11	--	30,909	21,993	2,892	100	79	575	5,239	--
Chippewa	25,690	--	22	89	136	2,677	113	58	--	538	14,783	4
Clark	92,225	--	--	--	4,037	4,877	1,853	119	16	2,694	45,940	4
Eau Claire	27,899	--	--	--	5,585	7,244	381	47	17	557	6,957	1
Jackson	66,750	--	23	28	14,766	11,111	2,266	145	15	1,439	15,035	1
Juneau	63,938	--	--	--	30,922	13,177	1,214	--	--	426	2,611	--
Marathon	55,617	--	235	1,840	1,611	5,284	1,001	957	11	2,578	21,711	13
Marquette	17,958	--	--	--	1,944	12,451	1,036	10	22	145	310	1
Monroe	30,237	--	--	--	10,651	6,400	1,207	--	39	539	3,897	1
Portage	36,342	--	261	221	4,810	16,533	1,868	69	23	452	7,393	5
Waupaca	18,447	--	--	11	74	5,169	1,103	125	--	981	4,955	1
Waushara	27,498	--	--	11	1,070	22,009	2,569	73	--	119	582	--
Wood	44,181	--	28	149	5,078	8,658	2,846	777	--	476	19,481	1
Total	576,664	--	581	2,348	111,593	137,582	20,348	2,481	221	11,518	148,895	33
Southwestern												
Buffalo	5,499	--	--	--	126	814	101	--	--	80	3,746	--
Crawford	175	--	--	--	--	--	--	--	--	3	8	--
Dunn	16,057	--	14	--	2,027	6,969	446	76	--	240	3,390	1
Grant	7,836	--	11	--	729	5,235	1,445	378	--	3	--	--
Iowa	18,099	--	--	--	118	2,336	828	16	--	1,461	2,541	31
La Crosse	2,421	--	--	--	261	1,293	256	9	--	19	398	--
Pepin	1,018	--	--	--	9	102	11	--	--	19	577	3
Pierce	546	--	--	--	--	268	106	38	--	7	52	--
Richland	1,574	--	--	--	80	184	607	3	--	22	270	3
Sauk	6,905	--	14	7	1,563	3,532	628	--	--	44	277	2
St. Croix	9,166	--	69	9	413	2,613	314	282	--	209	2,756	--
Trempealeau	9,903	--	--	--	86	3,767	1,066	196	--	170	3,195	2
Vernon	1,140	--	--	--	6	553	46	63	--	13	239	3
Total	80,340	--	107	17	5,420	27,665	5,854	1,060	--	2,290	17,448	44
Southeastern												
Brown	1,529	--	14	--	24	1,204	--	--	--	--	243	23
Calumet	9	--	--	--	--	--	--	--	--	1	--	--
Columbia	11,433	--	--	--	2,197	5,459	1,221	116	--	59	676	--
Dane	1,485	--	--	--	28	347	354	13	--	72	52	--
Dodge	39	--	--	11	--	--	--	--	--	--	9	--
Door	6,572	--	--	15	15	132	135	97	--	151	2,519	281
Fond Du Lac	1,106	--	--	--	--	110	292	68	--	14	282	3
Green	198	--	--	--	--	198	--	--	--	--	--	--
Green Lake	1,497	--	--	--	15	690	175	--	--	37	289	3
Jefferson	1,947	--	80	14	--	775	369	61	--	33	239	3
Kenosha	14	--	--	14	--	--	--	--	--	--	--	--
Kewaunee	375	--	--	--	--	154	29	--	--	14	158	--
Manitowoc	2,392	--	17	--	--	187	178	--	--	161	232	--
Outagamie	1,470	--	--	--	13	339	48	--	--	159	507	--
Ozaukee	43	--	--	--	--	11	22	--	--	4	--	--
Racine	188	--	--	--	--	13	100	75	--	--	--	--
Rock	521	--	--	--	--	480	21	--	--	2	--	--
Sheboygan	483	--	--	--	--	370	23	60	--	1	14	--
Walworth	2,630	--	--	--	--	1,429	698	32	--	17	239	3
Washington	1,900	--	--	--	76	673	985	96	--	11	--	--
Waukesha	3,304	--	15	--	308	2,263	240	202	--	12	--	--
Winnebago	434	--	--	--	--	398	26	--	--	4	--	--
Total	39,567	--	125	53	2,676	15,232	4,918	820	--	751	5,459	316
State total	2,810,929	462	77,555	25,911	336,911	324,858	47,209	44,284	8,112	77,496	980,212	6,468

(Table 12 continued on next page)

(Table 12 continued)

Forest Survey Unit and county [1]	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Northeastern												
Florence	922	530	4,352	488	5	409	--	6,979	4,180	336	151	322
Forest	2,095	1,162	12,266	2,192	15	4,284	--	23,112	15,740	1,972	1,108	683
Langlade	2,720	646	17,619	1,838	48	3,198	26	18,156	12,574	2,319	1,084	469
Lincoln	8,203	145	11,785	1,062	188	3,977	134	12,167	9,290	4,099	712	436
Marinette	1,176	647	6,791	651	2	86	1	8,180	4,754	998	597	403
Menominee	356	304	4,123	1,340	3	1,195	3	6,070	4,804	347	213	358
Oconto	1,033	364	3,601	363	12	405	--	4,590	2,788	185	65	221
Oneida	11,185	154	16,411	607	260	376	168	10,530	6,355	4,752	743	619
Shawano	108	39	1,446	310	2	203	1	1,217	912	138	67	26
Vilas	4,460	533	17,698	1,307	82	3,138	104	15,288	10,327	3,664	837	590
Total	32,258	4,524	96,093	10,158	617	17,271	439	106,287	71,724	18,808	5,578	4,127
Northwestern												
Ashland	602	36	5,625	572	5	1,169	4	7,051	5,981	859	518	43
Barron	177	2	1,772	79	3	79	6	1,045	1,082	345	123	21
Bayfield	3,115	1	16,248	421	64	183	56	7,349	5,978	3,528	1,088	192
Burnett	269	--	2,594	59	3	22	8	1,040	1,417	772	245	25
Douglas	780	1	22,005	303	7	118	10	5,258	8,214	804	406	51
Iron	632	661	6,715	1,297	--	3,040	--	13,764	9,331	1,021	556	370
Polk	398	--	1,206	73	5	17	--	857	951	730	290	8
Price	4,341	36	14,479	701	76	1,361	158	14,129	9,024	4,704	849	467
Rusk	2,568	27	7,707	488	325	1,194	30	8,061	6,152	1,635	580	111
Sawyer	1,828	50	24,534	1,541	12	1,246	27	19,286	17,111	3,209	1,834	189
Taylor	964	132	5,794	970	66	4,110	27	9,004	7,469	1,352	436	98
Washburn	571	1	3,828	110	5	53	10	1,876	3,464	483	167	35
Total	16,248	946	112,507	6,613	570	12,592	336	88,722	76,174	19,443	7,092	1,609
Central												
Adams	68	--	707	25	--	11	7	1,770	1,652	2,897	923	20
Chippewa	776	1	2,178	100	163	207	10	1,748	1,377	506	167	35
Clark	526	18	6,922	543	31	691	13	7,961	6,300	7,118	2,493	70
Eau Claire	166	--	1,422	85	1	45	13	1,379	951	2,279	728	41
Jackson	460	--	2,737	132	1	87	52	3,331	2,320	10,241	2,416	145
Juneau	112	--	720	31	--	20	12	1,157	927	10,208	2,369	33
Marathon	751	98	3,275	734	14	2,796	21	5,690	5,008	1,487	428	72
Marquette	63	--	256	21	1	11	4	293	210	889	280	11
Monroe	182	7	766	54	1	233	20	1,269	997	3,308	615	53
Portage	238	5	786	111	5	169	1	1,033	811	1,167	370	9
Waupaca	129	24	1,090	260	1	739	10	1,161	1,019	1,187	380	28
Waushara	21	--	139	24	--	5	1	73	48	549	200	4
Wood	88	3	1,017	99	1	97	1	1,413	1,097	2,232	629	10
Total	3,582	156	22,015	2,220	220	5,112	167	28,278	22,717	44,068	11,998	530
Southwestern												
Buffalo	32	--	175	13	--	6	2	186	120	74	18	7
Crawford	4	--	9	1	--	--	--	9	6	100	33	--
Dunn	171	--	767	40	--	13	3	668	707	402	111	12
Grant	--	--	6	2	--	4	--	11	9	1	1	--
Iowa	1,948	--	2,377	1	33	113	104	2,244	1,154	2,413	106	275
La Crosse	9	--	33	--	--	2	1	31	16	72	15	4
Pepin	122	--	70	2	3	5	1	40	26	22	3	2
Pierce	8	--	36	--	--	--	--	12	7	11	--	1
Richland	121	--	46	3	3	2	1	48	30	113	34	2
Sauk	83	--	84	3	2	3	2	85	50	406	114	6
St. Croix	48	--	1,137	43	--	13	3	543	486	157	62	11
Trempealeau	142	--	289	4	2	13	11	291	166	409	67	28
Vernon	120	--	19	1	3	5	1	22	13	28	4	2
Total	2,810	--	5,048	112	45	177	129	4,192	2,791	4,209	569	351
Southeastern												
Brown	17	--	1	--	--	--	--	1	2	--	--	--
Calumet	1	--	2	--	--	--	--	2	1	2	--	--
Columbia	18	--	121	7	--	4	2	126	79	1,030	312	7
Dane	--	--	69	9	--	--	--	151	150	217	24	--
Dodge	5	--	--	--	--	--	--	--	--	10	3	--
Door	214	114	774	94	--	--	--	1,200	674	55	34	69
Fond Du Lac	122	4	88	2	3	1	1	59	31	20	1	4
Green	--	--	--	--	--	--	--	--	--	--	--	--
Green Lake	120	--	46	7	3	1	1	28	17	42	20	2
Jefferson	122	--	60	3	3	2	1	85	66	26	5	2
Kenosha	--	--	--	--	--	--	--	--	--	--	--	--
Kewaunee	--	--	13	3	--	--	--	2	2	--	--	--
Manitowoc	25	63	372	70	--	--	--	671	367	13	--	38
Outagamie	25	--	169	31	--	2	2	63	39	56	9	6
Ozaukee	--	--	4	1	--	--	--	--	--	--	--	--
Racine	--	--	--	--	--	--	--	--	--	--	--	--
Rock	--	--	5	--	--	--	--	6	4	1	1	--
Sheboygan	7	--	2	--	--	--	--	2	1	2	--	--
Walworth	120	--	27	1	3	1	1	23	13	20	1	2
Washington	1	--	12	2	--	--	--	8	8	25	2	--
Waukesha	--	--	12	1	--	--	--	31	31	171	19	--
Winnebago	--	--	4	1	--	--	--	--	--	--	--	--
Total	797	180	1,779	234	12	11	7	2,458	1,487	1,691	430	130
State total	55,694	5,807	237,442	19,338	1,465	35,163	1,080	229,937	174,892	88,219	25,667	6,747

[1] Includes only those counties that supplied pulpwood in 1997.

Table 13.--Central States pulpwood production by State and destination, 1993-1997

(In thousand standard cords, unpeeled)

	Illinois			Indiana			Iowa			Missouri		
		Destination			Destination			Destination			Destination	
Year	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States
1993	55	25	30	143	47	96	13	13	--	78	13	65
1994	76	33	43	147	51	96	22	22	*	88	19	69
1995	81	33	48	310	212	98	23	22	2	113	12	101
1996	95	53	41	149	44	105	23	22	1	126	11	115
1997	70	21	49	175	70	105	35	31	4	133	11	122

* Less than 500 standard cords.

Table 14.--Trends in receipts of roundwood and residue as pulpwood, Central States, 1993-1997

(In thousand standard cords, unpeeled)

Product form and State	1993	1994	1995	1996	1997
Roundwood					
Indiana, Iowa, Missouri	28	42	54	62	58
Residue					
Indiana, Iowa, Missouri	71	86	243	70	83
All wood material	99	127	297	132	142

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Discusses 1997 production and receipts and recent production for other years in the Lake, Central, and Plains States. Shows Michigan, Minnesota, and Wisconsin production by species for each county and compares production by Forest Survey Unit with that of previous years. Presents 1997 production and receipt data for Illinois, Indiana, Iowa, and Missouri, and shows five production classes by county. Includes the 1997 production and receipts for the Plains States by species group and kind of material.

KEY WORDS: Roundwood, whole-tree chips, residue, pulpwood, particleboard, Michigan, Minnesota, Wisconsin, Illinois, Indiana, Iowa, Missouri, Plains States.